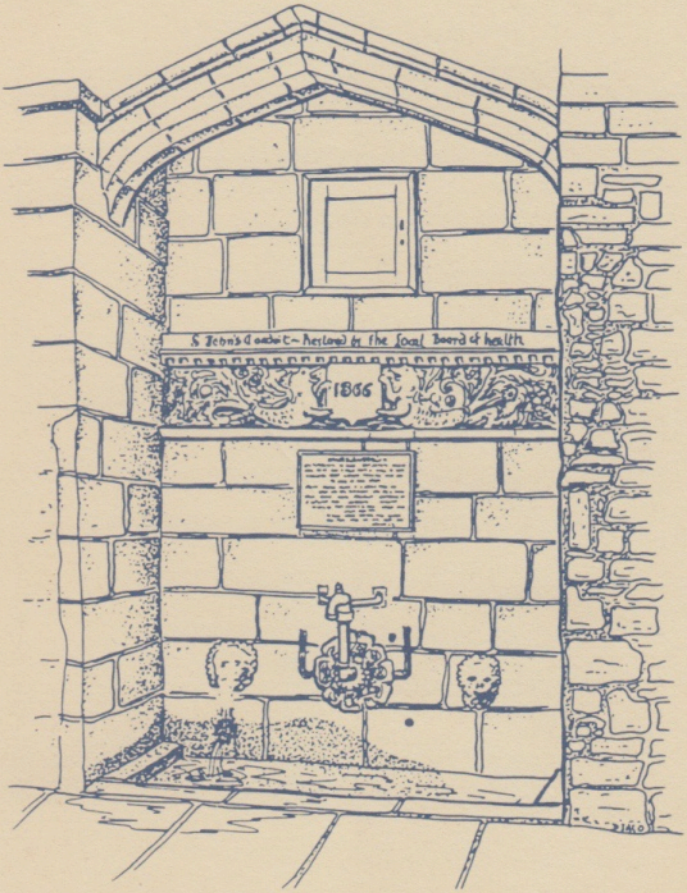
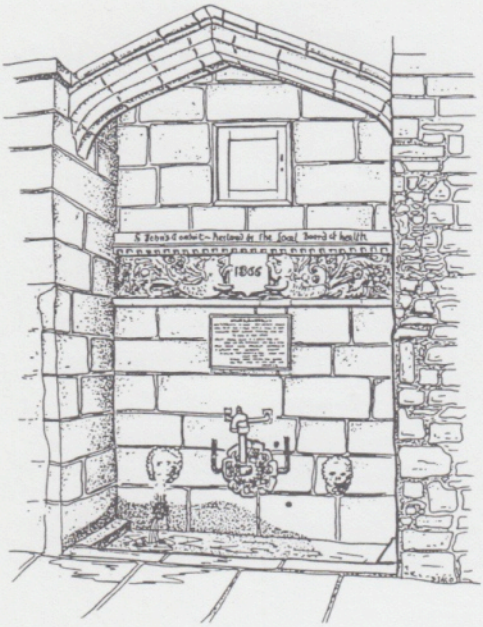
TEMPLE
LOCAL HISTORY GROUP
The History Society for Central Bristol

An account of St John's Conduit ~Bristol's Medieval Water System



Outlet of St. John's Conduit in Nelson Street


1865

ST. JOHN THE BAPTIST CHURCH - MEDIEVAL CONDUIT AT BRISTOL, ENGLAND.

A REPORT AND SURVEY OF FEATURES SURVIVING IN AUGUST 1984

This report has been researched and produced by the following members of the Temple Local History Group:

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Lynn Thomas
Ted Houghton
David Jago

assisted by many other people and organisations, (see separate sheet of acknowledgements).

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DEDICATION

It is with affection that this book is dedicated to the memory of Leonard Nott, M.A.I.E.(Hon), who died on the 3rd December 1984 as this book was being prepared for printing.

Leonard Nott, born in Bedminster in 1904, worked as a plumber and storeman for Scull & Sons. Later he became Industrial Editor for the House Magazine of Drake & Scull. His expert knowledge of this work enabled him to produce notes and diagrams which have added greatly to the interest and accuracy of this book.

All aspects of Bristol fascinated him and he walked, explored, noted, researched and photographed at a time when much was destroyed by development and later bombing.

Diverse talents - as a singer with the BBC West of England Singers, wartime entertainer (he narrowly escaped death at Redcliffe in an air raid) and as a raconteur in demand as a compere for functions such as the Beaufort Hunt Ball - all added to his wide knowledge. In 1952, he was one of the first Bristol City Guides to obtain British Tourist Authority qualification. Until his death he was Historical Researcher for Courage Breweries, a task he greatly enjoyed.

Largely due to Leonard's forethought in recording information before it was lost and his phenomenal memory and enthusiasm, many amateur historians have been inspired through his classes and the Fishponds Local History Society, of which he was the first President, to try to follow in his footsteps. We are privileged to have known and to have worked with him.

LOIS CANN
Temple Local History Group
6th December 1984

——— *oooOooo* ———

Courage Limited are pleased to sponsor this very valuable and interesting work as a tribute to the memory of Leonard Nott.

Over a number of years, Leonard carried out numerous research projects with skill, dedication and enthusiasm that was inspirational to all those with whom he came in contact.

Leonard had the wonderful gift of bringing the city's history to life and there are many of us in the company who have been enriched in knowledge by having had the privilege of working with him and sharing his boundless friendship.

BRUCE LEWIS
Public Relations Manager
Courage Ltd.

ACKNOWLEDGEMENTS

Although this survey and report has been carried out and produced by members of the Temple Local History Group, it has been a team effort, with many members of the team being outside our Group. It is not sufficient to say that we have received help and support from these people; their presence has been vital to the success of the undertaking. Therefore, to those of you listed below, plus many more, we say "THANK YOU!" This is your report as well as ours.

Chris Galbraith: of the City Engineer's Department, our ever cheerful guide and mentor.

The late Leonard Nott: for the use of his personal notes, research information, including the loan of his film of the conduit system, together with a sample of the medieval lead pipe which he had rescued.

Miss Mary Williams and the Staff: of the Bristol Record Office.

The Director of the City Museum & Art Gallery and **David Dawson:** Curator of Archaeology at the Bristol City Museum.

Geoff Langley: of the Central Reference Library and **Colin Clark:** of the 'Terriers' section of the City Valuers, for valuable time given to helping us for the winkling out of useful information from a wide variety of sources.

Ian Ford and Peter Smisson: for advice on the geological and topological features and hydraulic engineering aspects of the Conduit System and its route.

Alan Osborn: for his advice and work on the cistern dimensioning.

Moira Cosgrave and Nigel Lamus: for information and access to buildings and properties along the route.

Frank Gent, Dave Thomas and Chris Henderson: of the Royal Albert Museum, Exeter, for the vast amount of information and advice (on what to look out for) arising from their work on a similar Conduit System at Exeter.

Dorothy Greenhill and Teresa Gamble: for making typed sense of my, often scribbled, notes.

Dorothy Woolway and Emmie Bragg: who told us about the former shrine on the North West corner of Pipe Lane.

The Director and Staff, American School of Classical Studies, Athens: for help in finding details of Hadrians Conduit.

In addition to all the other people who gave us time, help and information, we must include:

'Freedom Engineering' of 10 Portland Square for the use of their **'Sonarange'** distance measuring instrument.

'Speedy Photos' of Bristol who have donated both the film and photographic processing for this report.

Courage Limited and The Bristol Guild of Guide Lecturers for sponsoring the publication of this report.

And lastly, **all of you** who have purchased this copy, so enabling us to continue our researches into these often overlooked bits of **Bristol's** history.

JULIAN LEA-JONES
Chairman - T.L.H.G.

ST. JOHN'S CONDUIT SYSTEM

FOREWORD

The need for this Survey and account of the medieval water system arose from a visit to the Conduit Head at St. John's Church in 1982.

Due to a break in the pipe, since repaired, the water flow had ceased. Initial enquiries revealed that there was very little published information on the conduit system. Also, most of the narrative descriptions were very sketchy and several of the accounts bore a remarkable similarity to one another.

As a result of this, our Group decided to carry out a survey of the surviving features of the Conduit System. All known information sources were checked. In some instances it was necessary to re-format early documents so that a line by line comparison could be made of different accounts.

This report, therefore, is the result of the last two years of research by our Group. Every feature has been checked and verified or discounted. In instances where it has not (yet) been possible to prove or disprove statements, they are identified in the report with the intent of further examination during the 1985 programme of work.

A lot of difficulty was encountered because of conflicting and varying descriptions of supposedly the same features. Indeed, at one stage in our investigations we were reminded of Galileo who, when investigating the flow of water in rivers, declared that:

> "He found less difficulty in the discovery of the motions of the planets, in spite of their amazing distances, than in his investigations of the flow of rivers, which took place before his very eyes."

Although we are not anticipating the sort of problems that he had with the 'establishment', one must remember that the artifact(s) that we are investigating nearly four hundred years later were already more than three centuries old at the time of his statement.

This publication is intended to be reportive, as will be the follow-on report of the 1985 findings. However, if sufficient interest is shown, we will produce a narrative description of the history of the Conduit System based on some of the fascinating information that we have gathered in the course of our researches.

Our members are also working on a similar project for the Temple Conduit Pipe with the possibility of extending our research to include the St. Mary Redcliffe & St. Thomas' Conduit Pipe.

ST. JOHN'S CONDUIT SYSTEM - 1984

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CHAPTER 1

INTRODUCTION

This is an account of the 13th Century conduit system that supplies the water flow at 'St. John's Church on the Wall' in Nelson Street, Bristol.

Features extant in August 1984 are described in as much detail as available knowledge and accessibility have made possible.

This survey and investigation has been carried out by members of the Temple Local History Group, assisted by many people and organisations over the period July 1982 to August 1984 (see Acknowledgements).

A further programme of work is planned for 1985 when it is hoped to investigate certain features more fully. The results will be produced as an Appendix to this report.

CHAPTER 2

ST. JOHN'S CONDUIT THEN AND NOW

In 1267, the Order of the Carmelite Friars, whose Friary in Bristol was on the site now occupied by the Colston Hall, decided to have water piped to the Friary from their spring on the side of Brandon Hill. Records show that just over one hundred years later, in 1376, they agreed to grant the parishioners of 'St. John's on the Wall' a 'feather' from their main supply. (Note: A feather is a small branch pipe, just large enough - so the story goes - to accommodate a goose quill, i.e. about one inch in diameter.) A photograph of the original seal and a sample of pipe are held in the Bristol Record Office.

Examination of the 'Great Red Book', (Refs.1 & 2), an ancient record book for Bristol, for the 1st October 1376, confirmed that a plumber named Hugh White was required at his own expense to maintain the supply of water to the Quay Pipe, All Saints' Pipe and St. John's Pipe and provide one thousand feet of strong new pipe per annum. He was then to be paid ten pounds per year, received from several houses standing on the Bridge at Bristol for his term of life, with the proviso that if the supply failed for more than six days, he would be fined a year's fee, the full ten pounds!

To give an indication of the value of the contract to Mr. White, the Will Books for that century were examined. They revealed that monies bequeathed in estates varied from twenty shillings (one pound) to forty pounds for a Burgess of the City.

Although the Carmelite Friary, the All Saints' and the Quay Head Conduits are no more, the water from Brandon Hill is still routed to the conduit outlet at St. John's Church on the Wall.

CHAPTER 3

INTRODUCTORY NOTES TO THE SURVEY

For the purposes of this report, the convention of 'looking down' Park Street is used i.e.

North is to the left,
South is to the right,
West is to the top of the hill,
East is to the bottom of the hill.

The Imperial System is used for all measurements

All dates refer to 'Anno Domini' unless specified otherwise.

Where information from previous accounts or surveys is used, a reference is given. For full details of B.R.O. and other references, see Chapter 10.

Drawings, maps and photographs are also annotated as appropriate.

Enlarged copies of the drawings and maps shown in this book and which are held in the B.R.O., are available from the Temple Local History Group.

CHAPTER 4

THE ROUTE, AUGUST 1984

A spring fifty yards down from the top of Park Street rises in a well. The well, on the south side of the street, was formerly in the front garden of a house. "It was ten feet in diameter with stone seats around it" (Ref.3). The well shaft is six feet in diameter with a smaller parallel shaft at the bottom. The well, approximately twenty feet deep, is now in the roadway and is capped off beneath the road surface. At the bottom of the well shaft is a square cistern, approximately 6 feet x 6 feet x 6 feet deep.

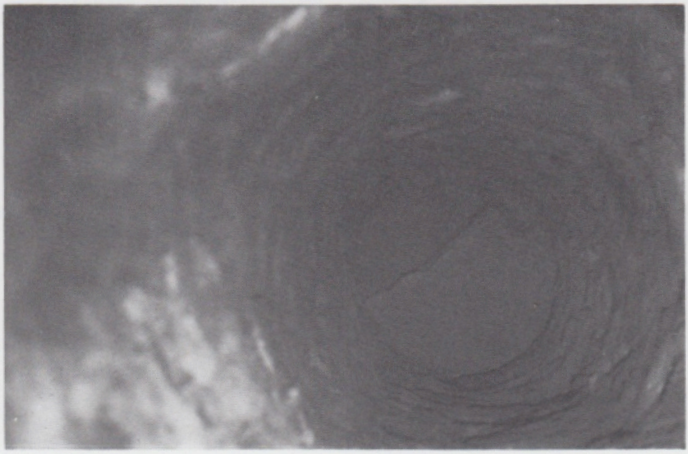


Figure 1. The Well

Judging from the undisturbed layer of silt on the bottom of the cistern, together with the steady flow off water over the rim, water must be percolating in through the side walls below tank level. This water then flows over the edge of the cistern tank and is channelled by a lead receiver into the three inch diameter lead pipe. This pipe is lying partly buried in the floor of a tunnel leading down Park Street.

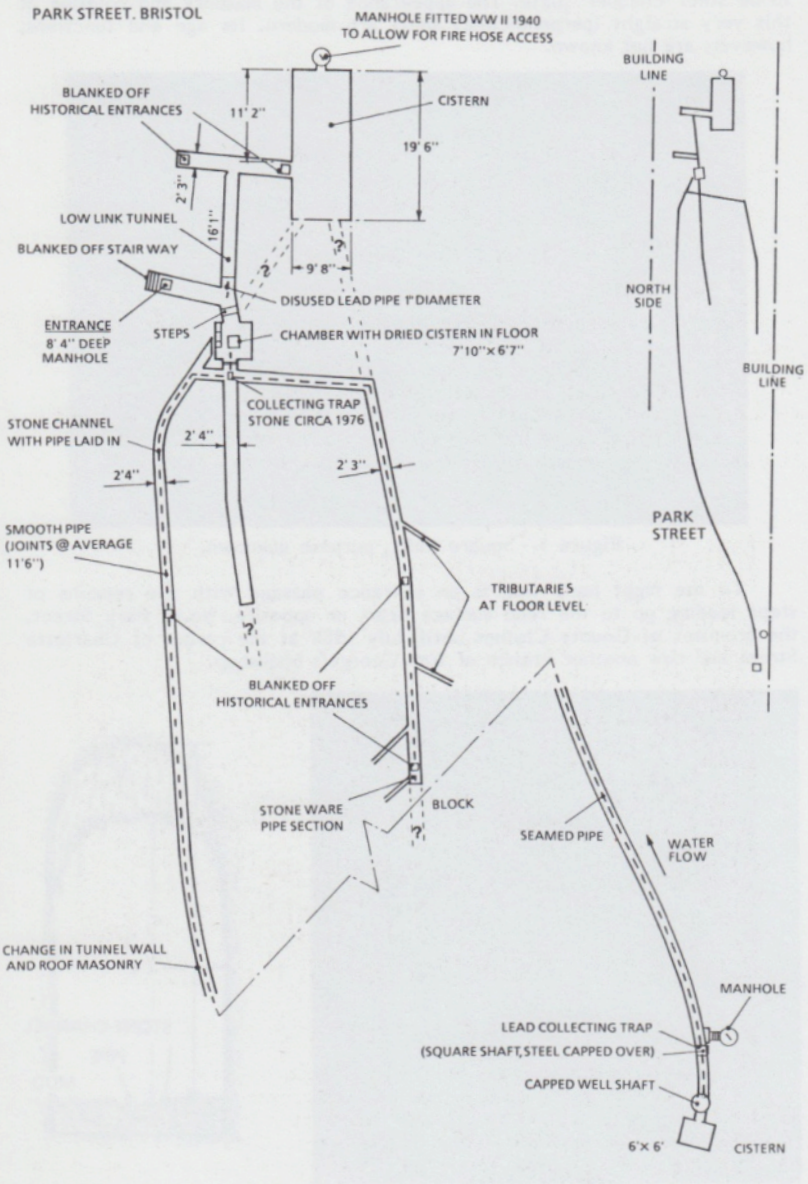


Figure 2. The Park Street Tunnel

Twenty feet along this tunnel the roof opens out into another shaft, five to six feet square. This ends beneath the road surface in what appears to be steel 'chequer' plate. The appearance of the masonry and pointing of this very straight (perpendicular) shaft are modern. Its age and functions, however, are not known.

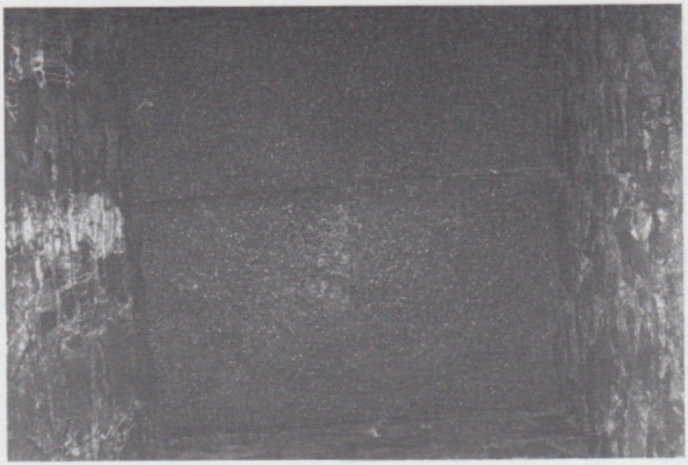


Figure 3. Square shaft, purpose unknown.

To the right hand side is an entrance passage with the remains of steps leading up to the road surface near, or opposite, No.75 Park Street, the premises of County Clothes until July 1984 at the corner of Charlotte Street and now another Branch of Wm. George's bookshop.

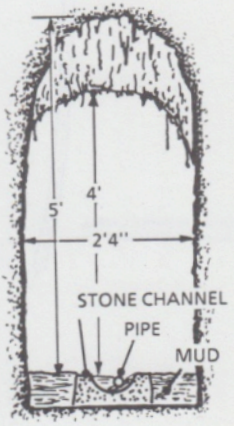


Figure 4. Flow Channel and Pipe.

The tunnel continues down Park Street, veering slightly to the left, followed by a straight run, after which it returns to the right.

In this section, the pipe is partially or wholly buried in a channel in the floor. The channel is about two and a half pipe diameters, or eight to nine inches wide. Due to a partial blockage of the pipe, water is also flowing in the channel alongside the pipe. In some places, silting of the channel has forced the water to run over the surface of the tunnel floor.

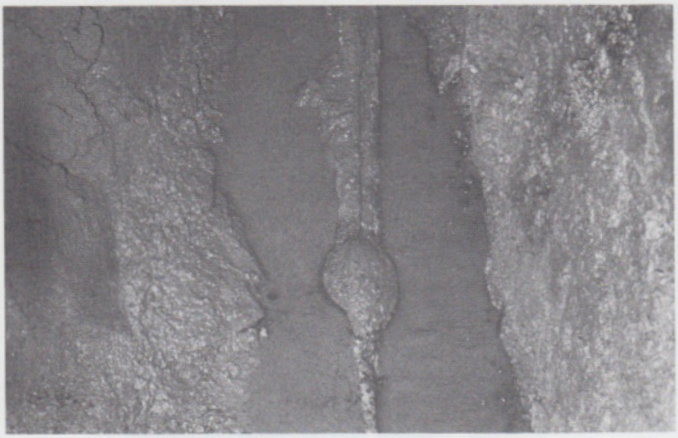


Figure 5. A Joint in the Pipe.

The tunnel enters a square chamber which has openings in each of its four walls.

Set in the floor of this chamber is a small collecting trap, ten inches x eight inches x six inches, into which run the outpourings of the Park Street spring, both from the lead pipe and water from the tunnel floor as referred to previously.

On the opposite (south) side of the chamber, a smaller lead pipe lying on the floor of its tunnel brings water reputed to be from the Brandon Hill Spring. The exact route of this short tunnel and subsequent pipe has not been determined.

On the west side of the chamber there is a short blocked off tunnel. No pipe or conduit is visible in this tunnel which ends in a blank wall after only thirty feet.

Prior to 1976, there was a simple 'T' junction of the pipes in this chamber. However, the City Engineer discovered a blockage between here and the well, and the trap to collect and direct the overflow was adopted as an economical solution.

In the face of there being no other evidence, the blanked-off section may have been a tunnel aborted due to difficulties encountered during construction, or a roof fall may have damaged the tunnel, or the tunnel may have subsided when it was built over. Any of these possibilities could have resulted in a bypass tunnel. The plan view of the tunnels shown in Figure 1, shows that the tunnel coming from the Park Street Spring/Well does seem to skirt around this short tunnel. The reasoning behind this possibility is explored in more detail in Chapter 7.

The possibility that a roof fall damaged the tunnel is supported by observation of the lead conduit pipe. The pipe leaving the well is of the earlier seamed style, whereas by the time that it reaches the junction chamber and collecting trap, the style is of the later extruded pipe. Although it is probably not possible to find the transition join without excavation of the silt on the tunnel floor, a change in the tunnel walls may indicate a later addition.

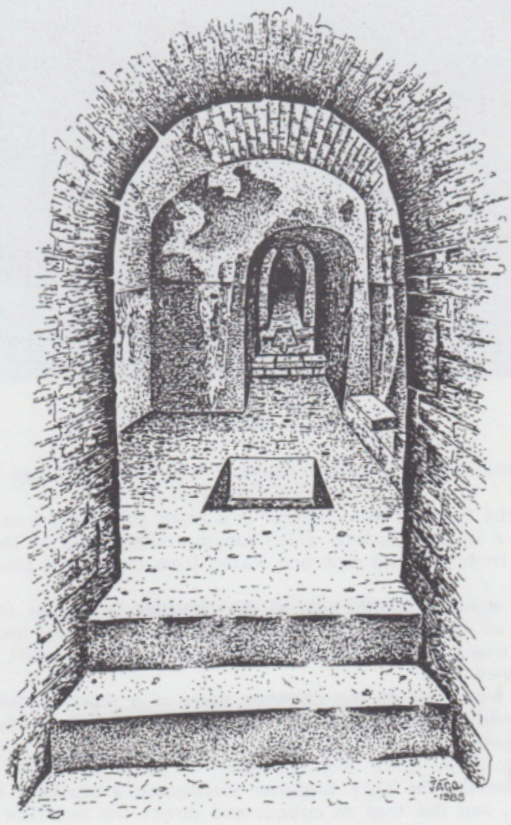


Figure 6. The Junction Chamber

The outlet from the collection trap in the floor, which combines the flow from the Brandon Hill and Park Street springs (the Park Street spring provides the majority), leads into the open end of a three inch diameter pipe. This pipe is laid in the floor of the tunnel continuing down Park Street.

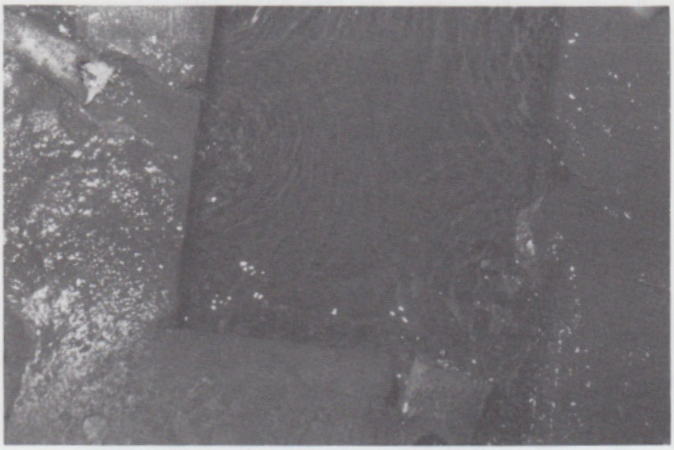


Figure 7. Close up View of Collecting Trap (1976) together with the Arrangement of Inlet and Outlet Pipes.

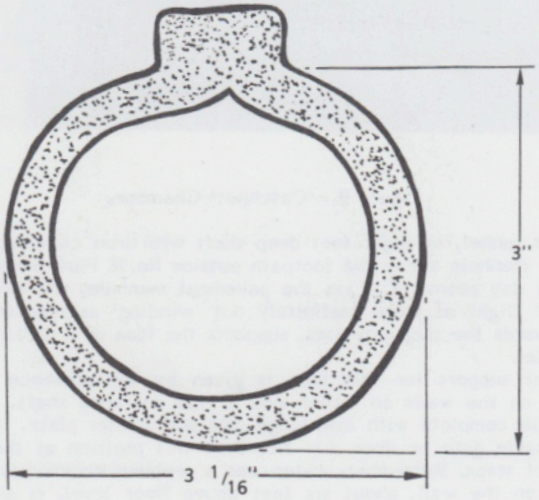


Figure 8. Tracing of Conduit Pipe from a Section supplied by the late Leonard Nott.

After a distance of ten to fifteen feet, the tunnel again opens out into a chamber with a large pit in the floor. This is filled with mud and debris and is covered over with builders' planks. This pit is possibly one of the 'dipping holes' referred to in the 1864 B.O.H. Report 4.

A few feet further on to the left, is a short cross tunnel which is the present day (1984) entrance to the Park Street system.

Figure 9. 'Catchpot' Chamber.

In this tunnel, an eight feet deep shaft with iron climbing rungs leads to a square manhole set in the footpath outside No.58 Park Street. Although the present day entrance is via the pavement manhole, the existence of a blanked off flight of steps (definitely not 'winding' as reported in Ref.4) leading towards the shop premises, supports the idea of a locally accessible 'dipping hole'.

Further support for this idea is given by the presence of Pennant Stone pads on the walls on either side of the entrance shaft. These stone pads are still complete with iron hinge pins and striker plate. It is assumed that a lockable gate or door was fitted at this position at the bottom of the flight of steps. Remember, water was a precious commodity. Above the hinge pins on the wall, about six feet above floor level, is an iron hook. Possibly, this was used to hold a lantern when the householder or servant entered the chamber to get water for the household.

Closer examination of the hinge pins and surrounding masonry for signs of wear will be necessary to determine if a gate or door was actually fitted.

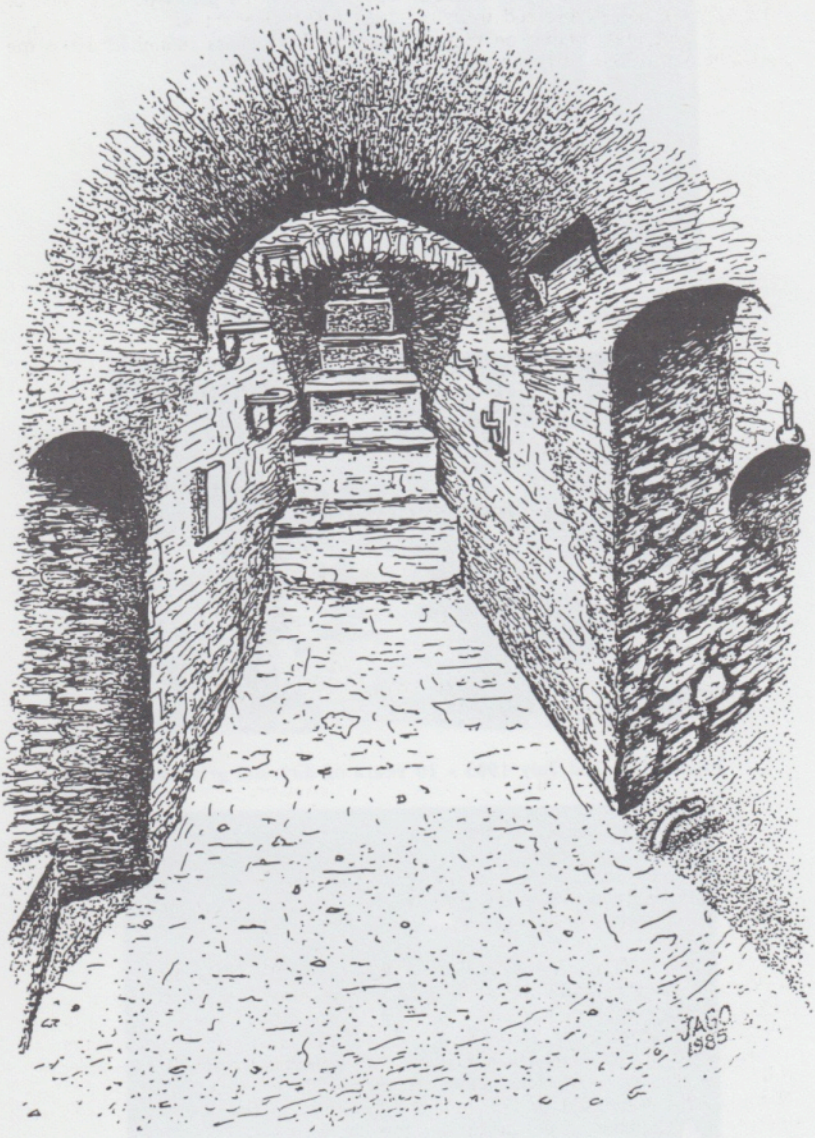


Figure 10. The Entrance Shaft.

Figure 11. Manhole in the Footpath, Park Street.

Figure 12. 2nd July 1983 - 10 years of dirt and grit to clear.

Figure 13. Two Man Lift!

Retracing our steps back into the tunnel system, to our left is a smaller tunnel, 5 feet 6 inches high, reducing after a foot to three feet high. This tunnel, leading down Park Street, is sixteen feet long. At the entrance to this tunnel is a small three inch length of one inch diameter lead pipe, cut and blanked off (roughly bent flat), protruding from the left hand side of the floor. This could be the remains of a short spur leading from the main conduit pipe either for inspection purposes, or one of the illicit branch pipes installed by local householders and subsequently disconnected by the Trustees.

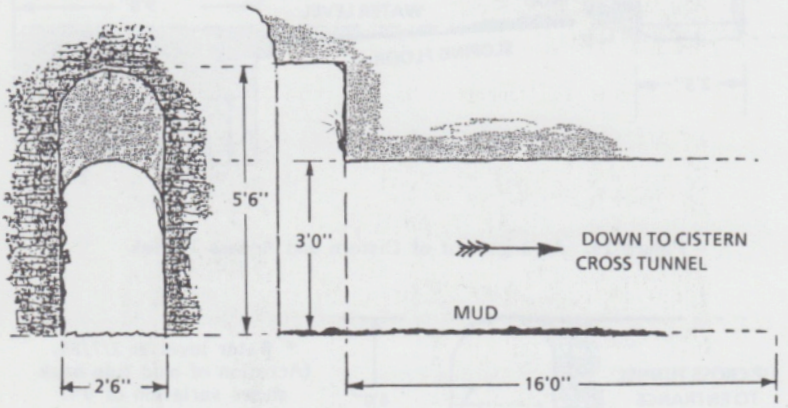


Figure 14. Tunnel leading to Cistern.

During the drought of 1865, the water flow at St. John's diminished. Upon inspection, one of the reasons for the reduced flow was found to be Park Street householders who had directed the water flow into their own branch pipes, or 'feathers' (A feather being a small branch pipe). This caused the author of a report in the newspaper of that day to refer to the householders "feathering their own nests". (Ref.3).

Passing down this tunnel at a stoop, it being only three feet high, one reaches a T-junction. The left hand branch ends after four feet in another blanked off flight of steps. These could have led to the cellar of Number 56, or 54 Park Street. Examination of the cellar walls of Numbers 79, 81, 58, 56 and 54 may reveal blanked off entrances. Numbers 56, 79 and 81 would be the easiest to examine as they survived the blitz of World War II which razed most of the street. The other numbered premises referred to have been rebuilt to a facsimile design (Ref.5a). An advertisement for the Nell Gwynne Cafe, formerly at 56 Park Street, stated that due to the Blitz, their premises were destroyed except for "a few teapots and tins of fruit". Their shop reopened within a month at 104 Whiteladies Road (Ref.5b).

Turning through 180 degrees and going along the other end of the 'T', the tunnel floor slopes down towards a cistern at the far end. The floor is under water for half its length (at July 1984). The mud tide mark along the tunnel walls indicates a change in water level of about nine inches, although the timescale of the variation is not known. However, the floor at

the other end of this section, at the base of the blanked off steps, is very muddy with dried plates of red mud (July 1984).

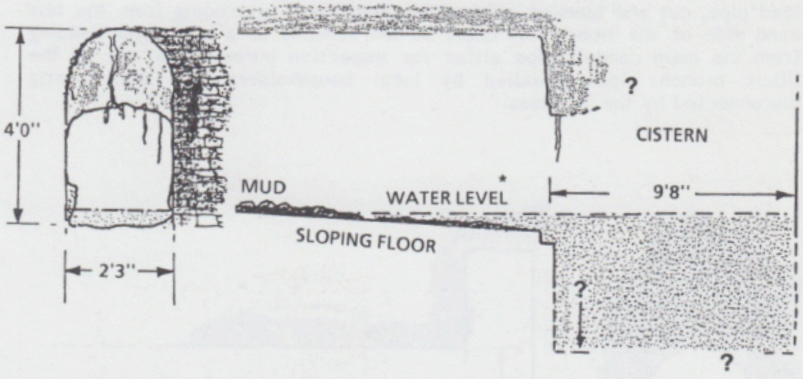
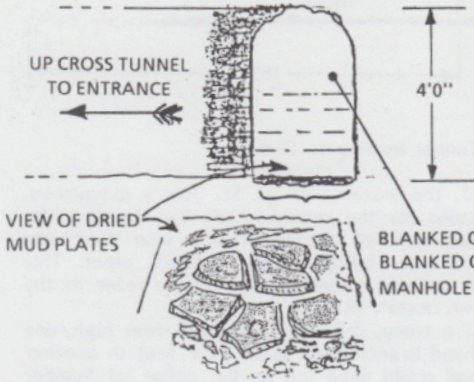


Figure 15. Arrangement of Cistern and Access Tunnel.



* Water level at 2/7/84. (Acretion of mud tide mark shows variation of 9"). Presence of 'mud plates' at the far end of the tunnel indicates that the floor is completely covered at max. flow levels.

Figure 16. Results of Changes in Water Level.

The tunnel leading to the cistern, the other leg of the 'T', is four feet long. Two feet along this tunnel, the water depth is fourteen inches (2nd July 1984), just sufficient depth to overflow into one's wellington boots.

The entrance to the cistern is an underwater ledge and for this reason it is dangerous to approach too closely. The dimensions of this cistern were measured using a modern measuring instrument called a 'Sonarange' and were found to be 19 feet 6 inches by 9 feet 8 inches. Because these figures disagreed with previous accounts (Ref.6), the instrument was re-calibrated and the measurements taken again. The same results were obtained. This

indicates that unless there were hidden obstructions to the measuring beam, such as buttresses, these measurements are more accurate than those taken previously. Subsequent enquiries have revealed that the previously reported dimensions quoted were the result of assuming that the earlier reports were correct. It is possible, therefore, that this continued an earlier error. Further work is planned to prove or disprove this.

Note: The 'Sonarange' is an ultrasonic radar distance measuring device. It was loaned to Temple Local History Group by the manufacturers, a Bristol Firm, Freedom Engineering of 10 Portland Square. It measures distances from a few inches to 100 feet at the press of a button. At the flick of a switch, it will also display the results in metres. To Freedom Engineering, our grateful thanks.

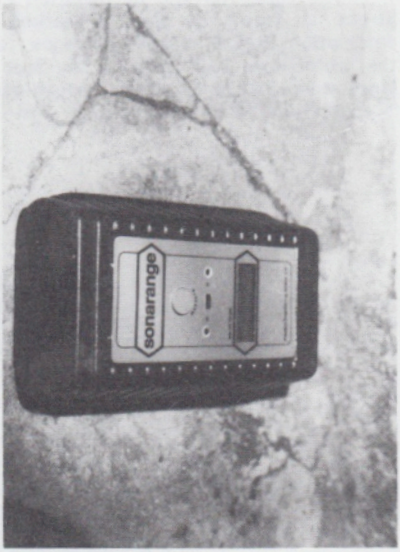


Figure 17. Sonarange Distance Measuring Instrument.

Although the cistern wasn't entered, previous reports quote the depth as being six to seven feet and that the conduit pipe leaves it by breaking through the masonry on the lower left of the chamber towards the cellar of Number 56 Park Street (Ref.6). The City Engineer's Department representative reported that a manhole in the roadway just above the junction with Great George Street leads into the cistern via "a sort of slipway or chute".

The outlet pipe has been described (Ref.7) as being lead, three inches in diameter with a one inch axial bead running along the top surface as shown in the drawing (Figure 8).

Previous surveys state that the pipe (Ref.6), having entered the coal cellar (in 1909) (Ref.8), was enclosed in a subway. Examination of the cellar of Number 52, a storeroom of George's fine art shop, in March 1984 disclosed a boxed in ledge about five inches wide running across the width of the cellar. It is possible that the conduit pipe is enclosed in this. No other signs of the conduit are evident.

In the cellar of Number 54 there were reported to be four stones marked "Conduit Pipe", two set in the wall and two in the floor of the cellar (Ref.6). These have yet to be checked. However, the previous remarks concerning the possibility of surviving cellar entrances may also apply (Ref.5).

"From here the pipe travels further down the street until at Number 44 it is 22 feet from the rear wall and 3 feet 6 inches from the party wall of Numbers 44 and 42." (Ref.6).

From this point, the route as shown on previous maps, including the City Corporation drainage department and the Scholar's map of medieval water systems (Ref.15), travels diagonally to Culver Street via Hamilton Place.

The upper terrace of Hamilton Place at the rear of Number 36 Park Street is shown to have a marked stone set in the wall. The 1909 description (Ref.8) makes reference to going under steps, that is through the arch shown in Figure 18. Six feet past this arch, set in the wall, is a large stone plaque on which, though very badly worn, portions of the words "Conduit" and "Pipe" can still be seen (August 1984).

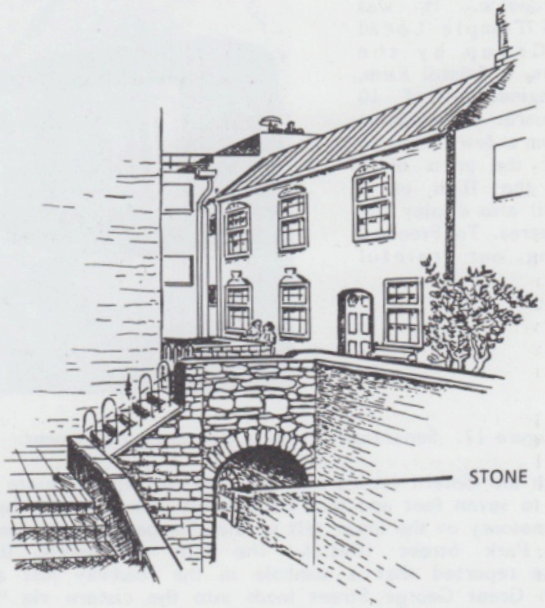


Figure 18. Premises of the School of English, Hamilton Place.

The 1909 report inexplicably refers to the words "Marsh Conduit Pipe"?! Figure 19 shows that this stone plaque has a semi-circular top which is set in the head of a brick arch in a surrounding wall of masonry. Below this stone is what appears to be a bricked up entrance, whether alcove or passage has yet to be determined. There is a small half-brick sized hole at ground level which may be for drainage. If it is a drainage hole, there may be another 'dipping hole' or collecting cistern somewhere beneath Hamilton Place. A representative of the City Engineer's department has stated that there was an alcove with a lead pipe visible running vertically down the wall at the back of the alcove through which water could be heard running. This was in the 1960's. It may have had a tap fitted at some stage. This is to be investigated further.

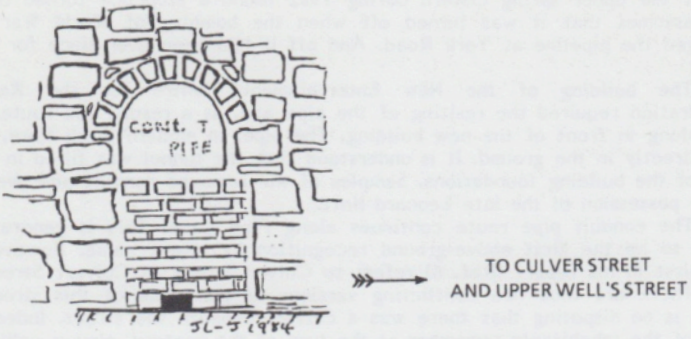


Figure 19. Conduit Marker Stone beneath Hamilton Place.

Hamilton Place is occupied by the 'School of English' and although the pipe was reported previously to run through the kitchen 2 feet 6 inches from the fire place, it cannot now be traced (Ref. 6). However, their Secretary, Moira Cosgrave, drew our attention to a cupboard or small storeroom off to one side of the three steps between two rooms. Due to occasional noises of water and dampness, it is possible that beneath the floor of this room there is evidence of the conduit pipe or water system. Confirming this will involve removing the contents of the room together with the wooden floor. Arrangements are being made for our members to do this when convenient to the school staff.

At the junction of Culver Street and Wells Street, there was a square manhole, seven feet deep, which gave entrance to another section of tunnel which ran for 160 to 180 feet, with the conduit pipe visible from the tunnel floor. The pipe then disappeared through the brick or rock face. Most reports assumed that the end of this passage was somewhere beneath St. Augustine's church school and that the pipe continued under the school houses until it reached the square chamber in the footpath of Frogmore Street. This chamber was reported (Ref. 7) to be 100 feet west of Leopard Lane, which has long since vanished, but the manhole must have been nearly opposite Orchard Avenue.

This chamber was reported to be between five and six feet deep and, interestingly, the 1865 map (Ref.9) shows there to have been a stopcock in this chamber. This is the only previously documented mention of a stopcock along the route and although the age of it is unknown, a possible reason for it would have been the proximity of the main storage cistern for the Friary. It would have been helpful to be able to interrupt the flow to it for servicing or cleaning.

As an interesting aside, work carried out on the Redcliffe Pipe from the spring in Knowle, in preparation for the water maze in Victoria Park, led to the discovery of a similar stopcock. Part of the Redcliffe Pipe Ceremony each September, involves opening bleed valves at intervals along the route to check that water is flowing. This has been carried out to the participants' satisfaction annually for many years. However, the aforementioned work for the maze resulted in the discovery that the only water which had flowed out of the pipe each year was that which had seeped past a blockage near the top of Windmill Hill during the previous twelve months. When the pipe-full of water had emptied, the flow had

stopped. After months of searching, a team of volunteers cleaning the silt out of the upper spring cistern during 1982 found a stopcock turned off. One assumes that it was turned off when the bombing of World War II damaged the pipeline at York Road. And off it had been ever since for 38 years!

The building of the New Entertainment Centre for the Rank Corporation required the resiting of the pipe and, as a result, the route is now along in front of the new building. The pipe, in modern pitch fibre, is laid directly in the ground. It is understood that the tunnel was filled in as part of the building foundations. Samples of the removed conduit pipe were in the possession of the late Leonard Nott.

The conduit pipe route continues along Pipe Lane. This is generally taken to be the first above-ground recognition by street name. However, Mr. Hirst in his report (Ref. 6) refers to Culver Street as Culvert Street.

There are thus two conflicting versions of the name of this street. There is no disputing that there was a culvert beneath the street. Indeed, some of the inhabitants remember at the turn of the century, always calling it Culvert Street. Mr. Hirst the architect, in 1931, referred to it as Culvert Street. The present street name, Culver Street, is taken from 'Culver' or dovecote and implies, therefore, that this is where the Dovecotes for the Gaunts Hospital were situated viz. Orchard Street, Frogmore Street, etc. Enquiries in the Bristol Records Office have failed to produce any conclusive proof that there was a dovecote there, other than the fact that it is called Culver Street, therefore, because 'Culver' means 'dovecote', there must have been..... This, although a minor matter, is a good example of how historical research can get lost in an etymological thicket.

In Pipe Lane there are two inspection covers referred to as "Lamphole Frame and cover on it for inspection purposes" (Ref. 6). The City Engineers department confirm that beneath there is a vertical 'T' branch (inverted) with a bleed hole, in a small culvert. The pipe section is in cast iron.

The 1909 report refers to a cover in Host Street as a Lamphole although Mr. Hirst (Ref. 6) calls an identical manhole, that outside Number 58 Park Street, as just a "Frame and Cover" (Ref. 8). The term 'Lamphole' derives from the Victorian sewers and refers to small, about twelve inches in diameter, covers beneath which there would have been a vertical shaft leading down to the sewer, or in this instance Conduit, down which a lamp could be lowered for inspection purposes (Ref. 10).

A report has been received that on the corner of Pipe Lane and Frogmore Street, on the opposite side to the Colston Hall, at or near the point marked 'S' on the plan was a statuette of a female figure set in a niche in the wall. The figure was about two feet high with a bowl beneath. We were assured that it wasn't a fountain but more like a Piscina or stoop and was thought to be connected with St. Augustine's Friary (the Carmelites) (Ref. 11 & 12). Subsequent information received indicates that it is more likely that the niche, now stored in the City Museum (Ref. 13) belonged to the Hospital of the Gaunts (Ref. 14), a view supported by David Dawson.

The pipe continues along Pipe Lane, originally in 1267 the end of the route as the water supplied the main cistern for the Friary. Although the location and size of the cistern is not known, one can be reasonably certain that it still exists somewhere in the vicinity. Tests carried out by the City Engineers department during the 1976 investigation, involved putting tracer dye in the conduit system at the top of Park Street. This took but a few minutes to reach Frogmore Street but nearly four hours to reach Host Street, implying a large mass of water between the two points, excluding the Park Street cistern. For a calculated estimate of the volume of the

cistern, see Chapter 8.

"Lampholes or lamp eyes are placed about half way between manholes. As their name implies they are intended for letting a lamp down." (Ref. 10).

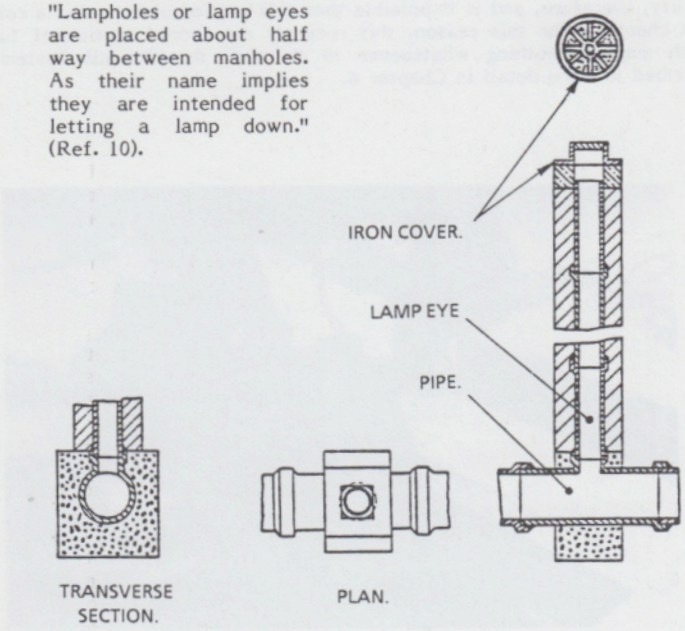


Figure 20. Lamphole - A Typical Arrangement.

The extension of the conduit system from this point is a feather or branch pipe and dates back only to 1367. It passes the Colston Hall, previously the site of Mr. Colston's School (1707-1863) and before that the Great House of Sir John Young (1574-1707) and, back further still before the Dissolution, the Friary of the Carmelites.

The next sight of the conduit water is beneath Host Street, nineteen feet past the eastern boundary of the rear of the Church of St. Mary on the Quay. At this point there is a square manhole in the footpath beneath which, at a depth of eighteen to twenty inches, is an open pipe branch with water flowing in it. A pencil sketch plan in Mr. Groom's 1909 notebook (Ref. 8), shows this to be a branch or spur, in the form of an inverted 'T', as described for the Pipe Lane manholes.

The pipe at this point is in cast iron and from here the pipe continues to the bottom of Host Street, also in cast iron, although the bottom section leading to Christmas Street and across the River Frome has been replaced during 1983 in ductile steel.

As shown on the plan, there is a section of tunnel which was

discovered in 1982 by the Temple Local History group members. The reason for this tunnel has not yet been discovered. However, the proximity and similarity to the conduit tunnel cannot rule out the possibility that it was part of the 1367 extension. The conduit in the Host Street section is in cast iron, a sample of which has been sent to the Ironbridge Gorge Museum at Coalbrookdale for examination, and a likely earliest date for such a pipe is circa 1790. There have been major changes in the conduit system in this locality, therefore, and it is possible that this section of tunnel is a relic of such changes. For this reason, this recently discovered section of tunnel, which may be nothing whatsoever to do with the Conduit Systems, is described in more detail in Chapter 6.

Figure 21. Safety Precautions - checking for gas using a Davey Lamp. (Humphrey Davey was a protege of Dr. Beddoes' Pneumatic Institute at Bristol, where he was engaged by Dr. Beddoes in 1798 as Superintendent.)

The pipe, in cast iron, next makes an appearance in Christmas Street, just past the entrance to the underground car park beneath the South Western Electricity Board building. A square manhole in the footpath covers a brick chamber in which there are two conduit pipes, each complete with its own stopcock and bleed valve. One of these pipes is the St. John's Conduit that we have been following, the other is the now defunct All Saints Pipe. This latter conduit was supplied from a spring on the slopes of Kingsdown and went to All Saints Church conduit head(s) via Small Street. From this manhole, the St. John's pipe continues to the junction with Quay Street where it turns left by the gateway of St. John's and runs along beneath Nelson Street to the cistern beneath the vestry of St. John's Church. A small door, eighteen inches square, above the conduit outlet, leads to this cistern.

Nowadays, the water flow visible from the lion's mouth, is in fact the overflow from the cistern. This is because the brass tap, which is polished every morning by Mr. Ron Vincent a City Council employee, is turned off.

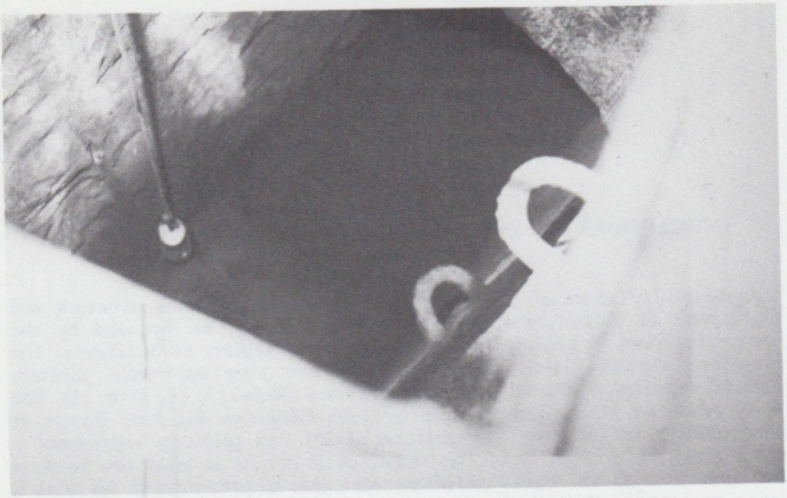


Figure 22. Looking down the Entrance Shaft in Park Street.

CHAPTER 5

CONCLUSIONS AND PROGRAMME OF FURTHER SURVEY TASKS

In spite of 717 years of changes, both in the organisational structure and topography of Bristol, the water still flows, if not as intended by the Carmelite Friars in 1267, at least by the church fathers of St. John's. The route and the pipe itself has been argued over, dug up, relaid, pirated, bombed, repaired, upgraded and still it survives (Refs. 15, 16, 17 & 18). The flow, measured at the lion's mouth by John Redgrove and Aldo Piristi, is four gallons per minute (12th October 1984) and probably represents a fraction of the original flow. This reduction is due to at least two factors; the reduction of the water collection area due to urbanisation (so that a large proportion of the rainwater now goes into the drains) and leakage from the pipe joints and cisterns.

However, thanks to the City Engineers, a flow is maintained sometimes by various 'dodges' such as we described in Chapter 4 (Page 7). Indeed, Bristol must congratulate itself on having one of the only medieval conduits in the Country still in working condition.

The work is by no means complete and it is hoped to add further to our knowledge in the programme of work scheduled for 1985. In a further report, comparative information will be included on the similar system that exists in Exeter, thanks to the assistance and advice provided by the Director and Staff of the Royal Albert Museum, Exeter.

There follows a list of feature which are still unresolved and which it is hoped will be investigated further during 1985.

* First, a detailed measurement of the Park Street tunnel system, possibly by using a marked chain or rope to give a continual reference point for photographs. These measurements will include distance, bearing, altitude (spot height) and declination if the necessary equipment can be acquired.

* Confirm depth and dimensions of the well and cistern together with the flow rate at the well head.

* Determine the purpose of the square shaft.

* Investigate and locate externally, the passage and steps near No.75 Park Street.

* Ascertain the details of the pipe channel in the floor of the tunnel.

* Dimension and examine the junction chamber in detail, likewise for the modern (1976) collecting trap.

* Determine, if possible, the transition point (if any) of the tunnel and pipe e.g. the change from seamed to smooth lead pipe.

* Investigate the 'Dipping hole' or collecting cistern and its contents.

* Examine the gate hinge pins for signs of wear.

* Extrapolate and determine from the slope of the steps, the point of entry into Nos. 54 or 56 Park Street.

* Photograph and measure the stub of pipe protruding from the floor.

* Make a detailed examination of the cistern from the inside, making use of the expertise of David Price's team.

* By the same method, find the outlet pipe.

* Make another attempt to locate the mark stones at No.54 Park Street.

* Verify or discount the dimensions and route of the pipe at No.44 Park Street. Carry out a document search and try to find evidence of the 'Marsh Conduit Pipe' (Ref. 8).

* Investigate what is behind the bricked up alcove under Hamilton Place. Consider using a drain camera through the hole at the bottom of the new brick wall.

* Investigate beneath the cupboard in the School of English (by arrangement with Mrs. Moira Cosgrave).

* Get more details of the stopcock. Appeal for details of the statuette and piscina reported to have been on the corner of Frogmore Street and Pipe Lane.

* Confirm that the manhole in Host Street is 19 feet from the eastern boundary of the rear of the Church of St. Mary on the Quay.

* Mark the exact location of the Christmas Street manhole on the plan and make a drawing of or photograph the double pipes and stopcocks.

* Locate the conduit 'house' reported to be on Brandon Hill and use a dye test to prove or disprove the Brandon Hill/Park Street route (at the Park Street collecting trap.

The results of the above are to be produced as Issue 2 of the main report together with an appendix for any additional supportive information. For instance, it has been reported that prior to the Roman Catholic chapel on the site of St. Mary on the Quay, Mr. Chilcott the jeweller and goldsmith, currently in Park Street, had a large house with gardens stretching down to the riverside. This would have been before 1841. However, Matthew's Directory for 1856 gives his address as No.9 St. Augustine's Place.

CHAPTER 6

THE HOST STREET TUNNEL

This chapter is based on the contents of two of our 1982 Newsletter articles. These resulted from initial investigations into the St. John's Conduit Scheme carried out by Temple Local History Group.

TLHG member, Mary Friend, who is also a member of the Church of St. Mary on the Quay, told us that water was coming in at the back of the church adjacent to the re-building in Host Street.

A visit to the builders at the church resulted in the discovery of a broken tap in a storage cellar, the reason for the water. However, the Site Manager, Phil Patrick, went on to say that they had found a storeroom full of rubbish and when the accumulation of years was cleared away, an opening in the rear wall was revealed.

The small opening, four feet high and one foot wide, was the entrance to a smaller room. A quick look showed that this inner room was, in fact, the entrance to a tunnel which seemed to run under Host Street towards the Colston Hall.

An appointment was made to return later with proper equipment and suitable clothing so that a preliminary survey could be made. The following day, John Redgrove, Derek Frary and Julian Lea-Jones returned, accompanied at the Group's request by two experts from the City Corporation, 'Jonnie' Walker and Chris Galbraith of the City Engineers department, who provided advice on the tunnel construction.

The tunnel, which was about one hundred feet long and ended in a rock fall, was a tight squeeze. At one point it narrowed to about one foot wide. Although the tunnel was longer than it first seemed due to a dog-leg bend, a further problem encountered was that the middle section narrows to only eleven inches wide above the five foot mark. With a bit of pushing and shoving, however, they managed to photograph and measure the remaining length. Radio location techniques were then used to plot the tunnel's course from above ground.

Radio location involves a volunteer with a small low power transmitter crawling along the tunnel whilst someone else with a special radio receiver above ground plots the strongest signals on a map or, in this case, with chalk directly onto the ground.

All of the measurements, together with the somewhat muddied notes, were then translated by John Redgrove, the Group's Acting Chairman, to form a legible map. The map includes the viewpoints of the twenty photographs taken by Derek. Subsequently, Pat Pryor of BBC Radio Bristol together with Julian Lea-Jones, visited the tunnel to record a 'spot' for Pete Lawrence's afternoon 'Compass' programme. Due to the unsafe condition of the tunnel it has since been bricked up. This still leaves the question, however, of what was it for?

Although the use of and the reason for the tunnel is not immediately apparent, its being part of the ancient conduit system, prior to that Section being replaced with cast iron, seems a tenable hypothesis. Its narrow width of just over a foot probably rules out bolt-holes, smugglers' passageways, sewers, etc., unless they smuggled one bottle at a time. However, it is possible that the original conduit for St. John's Conduit extension was laid in this in 1376.

The plan shows that the conduit now runs in cast iron pipe down the opposite side of Host Street (Ref. 15). It is possible that with the introduction of cast iron pipe, probably not before the 1790's, something happened to the tunnel such as a roof fall which meant that it was simpler to abandon it and lay the new cast iron style of pipe in a trench.

Footnote: 'St. Mary on the Quay' was designed by R.S. Pope and built in 1839 as an Irvingite Chapel. When the movement left in 1843, the building was taken over by the Roman Catholics. As far as can be ascertained, there were ware-houses on the Site previously. However, any information on the Site's history would be welcome. For instance, is there a possibility that the Site was linked to the Carmelite Friary by tunnel or water supply?

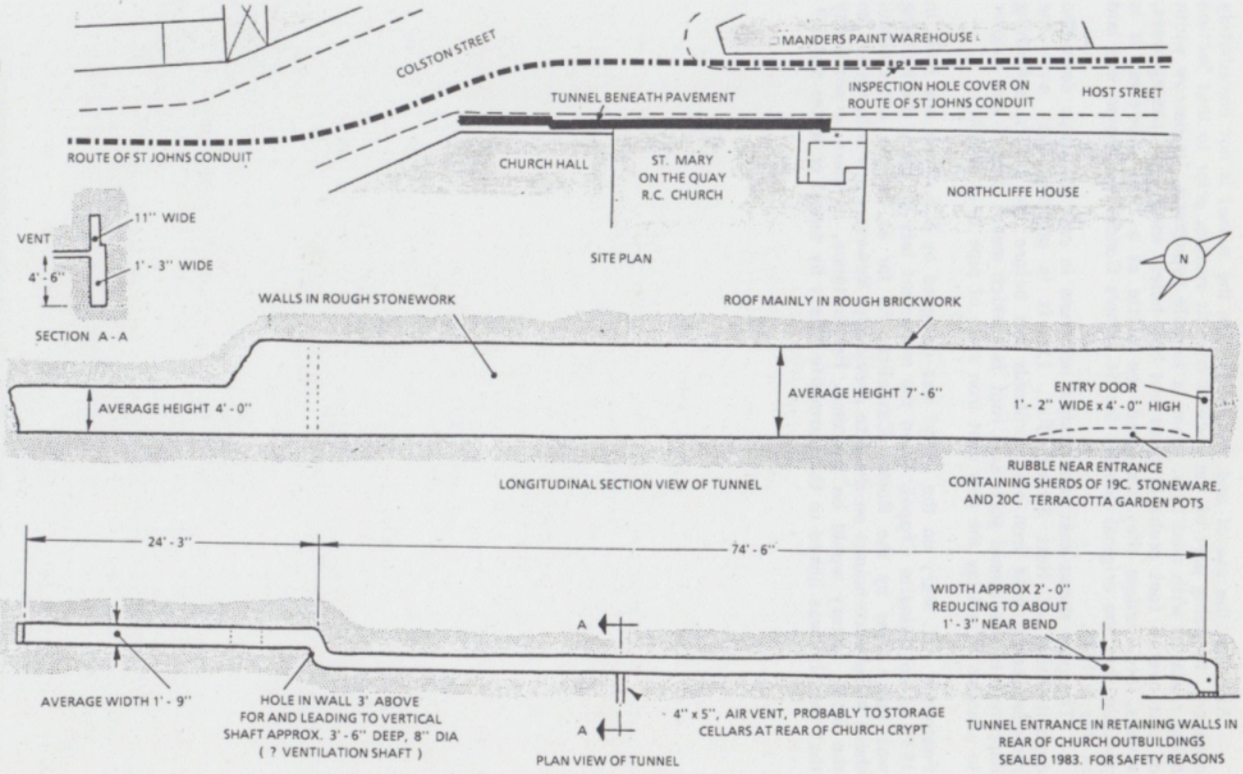

COLSTON STREET
MANDERS PAINT WAREHOUSE
TUNNEL BENEATH PAVEMENT
INSPECTION HOLE COVER ON ROUTE OF ST JOHNS CONDUIT
HOST STREET
ROUTE OF ST JOHNS CONDUIT
CHURCH HALL
ST. MARY ON THE QUAY R.C. CHURCH
NORTHCLIFFE HOUSE
SITE PLAN
N
VENT
11" WIDE
1' - 3" WIDE
4' - 6"
SECTION A - A
WALLS IN ROUGH STONEWORK
ROOF MAINLY IN ROUGH BRICKWORK
AVERAGE HEIGHT 4' - 0"
AVERAGE HEIGHT 7' - 6"
ENTRY DOOR 1' - 2" WIDE x 4' - 0" HIGH
LONGITUDINAL SECTION VIEW OF TUNNEL
RUBBLE NEAR ENTRANCE CONTAINING SHERDS OF 19C. STONEWARE. AND 20C. TERRACOTTA GARDEN POTS
24' - 3"
74' - 6"
WIDTH APPROX 2' - 0" REDUCING TO ABOUT 1' - 3" NEAR BEND
A
A
AVERAGE WIDTH 1' - 9"
HOLE IN WALL 3' ABOVE FOR AND LEADING TO VERTICAL SHAFT APPROX. 3' - 6" DEEP, 8" DIA (? VENTILATION SHAFT)
4" x 5", AIR VENT, PROBABLY TO STORAGE CELLARS AT REAR OF CHURCH CRYPT
PLAN VIEW OF TUNNEL
TUNNEL ENTRANCE IN RETAINING WALLS IN REAR OF CHURCH OUTBUILDINGS SEALED 1983. FOR SAFETY REASONS

Figure 23. Preliminary Survey of Tunnel beneath Host Street.

CHAPTER 7

THE GEOLOGY OF THE ROUTE - BRANDON HILL, PARK STREET, THE CENTRE

The present day topography of the area is essentially as it was at some time during the New Red Sandstone (Trias) Period, about 200 million years ago, when the older, exposed and eroded surface of carboniferous age rocks were covered and buried under the windblown desert sands. Subsequent burial and erosion has exposed much of the ancient desert topography and the relatively thin veneer of red sandy and muddy triassic rocks have given rise to the names 'Redland' and 'Redcliffe'.

The Carboniferous Age rocks of the area are marine or deltaic sediments, now sedimentary rocks, with the old sea beds or bedding planes dipping approximately 30° to the south-east. These ancient sediments, which were laid down about 300 million years ago, occur today as a succession of rock types roughly analogous to the pages of a history book. In this area, these rocks range from the massive limestones of Clifton Down, through the sandstones and shales of the Quartzitic Sandstone Group to the Coal Measure Shales, Sandstones and coal seams (Ashton Little Vein) at College Green, continuing under the City towards Ashton Vale.

The rocks of the Quartzitic Sandstone Group, usually abbreviated to 'Q.S.G.', are also known as 'Millstone Grit' and locally as 'Brandon Hill Grit'. They consist of beds of hard Quartzitic Sandstones, red and purple in colour and occasionally grading into quartz pebble conglomerates (pudding stones) and inter-bedded with sandy shales. As the succession is followed upwards in age from Brandon Hill to the bottom of Park Street and the Coal Measures, the massive Quartzitic Sandstone beds become thinner and less frequent and have nearly disappeared by the time the junction with St. Georges Road is reached next to the 'Mauretania'. The City itself is a coalfield and contains probably hundreds of old shafts and mining trials.

The Q.S.G. has been quarried (Ref. 19) in the past and some of the rocks can be seen today as building stones in both Bristol Grammar School and Queen Elizabeth's Hospital School (Q.E.H.). They are very tough, hard, splintery rocks and can be trimmed and faced only with difficulty. The old builders were rarely able to cut and trim them into rectangular blocks like the Bath Stone or Doulting Stone Limestone used in many of our Bristol buildings. It would have been extremely difficult, if not impossible, for the people 700 years ago to dig trenches through them. The only way they could have excavated for the conduit route would have been to follow a naturally occurring fracture zone or fault. These rocks occur as foundation beds below a few feet of Trias on the old Prince's Theatre site (Park Row) and when this site was developed and blocks of flats built a few years ago, explosives had to be used to excavate the rock for the footings. The old buildings along Park Row have shallow footings in the Trias and the

builders did not attempt to get down into the 'hard stuff'.

These rocks are so hard because they are not just grains of quartz sand cemented together with Iron Oxide and secondary silica but are formed of interlocked grains at the molecular level. The ancient pre-Trias stress field which folded and fractured the carboniferous rocks of the area caused many of the quartz sand grains to grow into one another forming sutured contacts. The structure of the rock, therefore, is something like a 3-D jig-saw puzzle and is very tough, strong and difficult to work as a result.

These Q.S.G. beds occur under the New Entertainment Centre and the Hatchet Inn. The Colston Hall, the site of the Carmelite Friary, is also founded on them. It is unfortunate that the opportunity to examine the walls of the section of the Conduit which ran beneath the site of the New entertainment Centre has been lost (see plan of route) (Ref. 7). It may have been possible to determine if the tunnel followed a naturally occurring fracture zone as predicted.

The red Trias rocks are mostly red, sandy, calcareous mud stones which tend to disintegrate in water but which can be firm and solid enough to build on if buried in the ground. The old builders could have dug into them, with difficulty in some places and trenching and excavation would have been possible with fairly primitive equipment. Any of the old Conduits or drains can be expected, therefore, to be in either Triassic Rocks or following fracture zones (faults) in the tough underlying rocks of the Quartzitic Sandstone Group.

CHAPTER 8

THE MISSING CISTERN OF THE CARMELITES

Calculations were performed to determine the minimum dimensions for the missing cistern. The earlier, somewhat crude attempt to establish the size of the 'missing cistern' (Ref. 12) led to investigating the possibility of a more accurate estimate. Relevant formulae were found (Ref. 10) and a more accurate drawing was made of the Conduit System. Times of flows from Park Street to Frogmore Street and Host Street were calculated and compared with the results from earlier dye-tests.

Good agreement within the accuracy of the calculations' assumptions and errors was found for Frogmore Street. A significant discrepancy was found between theoretical and observed times at Host Street. Several theories were considered to account for the discrepancy. The most likely explanations are that either the cistern exists somewhere between Frogmore Street and Pipe Lane or, more probably, the conduit has a much greater effective diameter than that estimated, probably due to accident rather than design.

Some further investigative work has been proposed to refine the calculations for the conduit section of interest and various other recommendations made which might provide useful information.

The initial tasks were to establish more accurate methods of calculation and to characterise more accurately, the conduit system. The method was first to calculate the depth of water running in each section of the system. Then the rate of flow and time for each section was calculated. These were then added to give the times from Park Street to Frogmore Street and Host Street. Comparison of the theoretical and observed times then revealed a significant discrepancy at Host Street.

Calculations then established the extra volume of water to account for the discrepancy. Finally, minor calculations were performed to illustrate the theories attempting to explain the discrepancy. At the end of this Chapter, an attempt has been made to summarise the many assumptions and inaccuracies in the work.

To determine the Conduit System features, it was divided into eight sections as shown in Figure 24. Those sections were:

A.	Park Street well head to lower collecting trap
B.	Park Street to Culvert Street
C & D.	Culvert Street to Frogmore Street
E.	Frogmore Street to Pipe Lane

F. Pipe lane to Host Street

G & H. Host Street to St. Johns

The sketch shown in Figure 24 has been improved and illustrated by Julian Lea-Jones and appears as Figure 25. A glance at these two Figures shows that certain sections of the pipe or conduit must be full owing to the creation of sumps by the rise and fall of the pipe runs. These sections are D, E and H. For the purposes of calculation, a drop for each of these sections of 3 inches (0.25 feet) has been assumed, i.e. approximately one pipe diameter. Sections D, E and H have, effectively, very shallow slopes.

The conduit known parameters are as follows:

(a) Time, Park Street - Frogmore Street = 10 minutes

(b) Time, Park Street - Host Street = 240 minutes

(c) Rate of flow = 4 gallons per minute*

(d) Medieval pipe bore = 2.25 inches diameter

(e) Modern pipe bore = 3.0 inches diameter

* Measurement (c) was not made simultaneously with (a) and (b). However, both sets were performed during or after long periods of dry weather, so justifying the assumption that they may be regarded as simultaneous for these purposes.

It should be noted that a local peak elevation is assumed at Pipe Lane.

The formulae used were as follows:

1. **Required Diameter of Pipe** (S & S p.31)

$d = 0.2216(Q^2/s)^{1/5}$ ..... (1)

Where d = diameter in feet (see Note 1).
Q = flow rate in cu. ft./second.
s = sine of angle of pipe where s = q/l and
q = vertical drop
l = length of pipe.

2. **Velocity of Flow** (S & S p.29) (Neville 1853)

$v = 140(Hs)^{1/2} - 11(Hs)^{1/3}$ ..... (2)

Where v = velocity in ft/sec (see Note 2).
H = hydraulic mean depth (see Note 3).
s = q/l = sine of angle of inclination of pipe as above.

Note 1: This formula is for practical engineers and probably leaves a margin for sudden increases in flow. It is assumed, therefore, that the pipe diameter calculated is greater than that necessary to accommodate the flow (Q).

Note 2: The reference work does not state the velocity parameters.

However, by comparison with another formula given, (Eytelwein 1815) (Ref. 10), velocity is apparently in ft/sec.

Note 3: The Hydraulic Mean Depth Factor (H.M.D.F.) takes into account the drag on a moving volume of water in a pipe or channel caused by the wetted portion of the pipe.

To establish the depth of water in each section of the conduit:

The maximum rate of flow in an inclined pipe occurs when the water depth is 5/6ths of the pipe diameter (see Table 1 - Flow Data for Circular Pipes). Therefore, the calculated pipe diameter (d) is assumed to be 6/5ths of that needed to contain the equivalent circular diameter of water (d_1). Thus:

$$d_1 = d \times 5/6$$

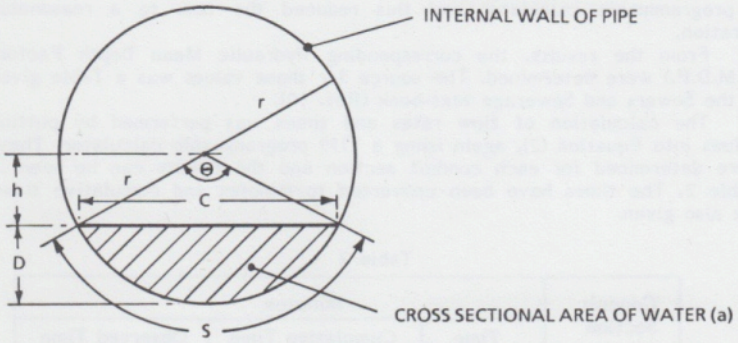
i.e. $$d_1 = 0.2216(Q^2/s)^{1/5} \times 5/6 \quad \text{ft. (from Eqn.1).}$$

$$= 0.1847(Q^2/s)^{1/5} \text{ ft.}$$

The cross-sectional area (a) of the water flow = r

i.e. $$a = \pi(d/2)^2 \text{ sq.ft.}$$

$$= \pi[(0.0923(Q^2/s)^{1/5}]^2 \text{ sq.ft. ..... (3)}$$



Establishing the cross-sectional area of water (a) from the diagram above,

$$a = Sr/2 - Cr/2.\cos(\theta/2)$$

Where θ = angle subtended by the chord
r = radius of the pipe
a = segment area (i.e. cross-sectional area of water)
S = arc length
C = chord length

The chord length was determined from the depth of water (D) where

$$C = 2(r^2 - h^2)^{1/2} \text{ (where } h = r - D)$$

An iterative process using a TI59 calculator was employed to establish differing values of D to give the same cross-sectional area as determined from Eqn.3.

Table 1 - Flow Data for Circular Pipes

Depth of Flow	H.M.D.F.
1/12 bore	0.0513
1/6 bore	0.0986
1/4 bore	0.1466
1/3 bore	0.1847
5/12 bore	0.2182
1/2 full	0.2500
7/12 bore	0.2728
2/3 bore	0.2900
3/4 bore	0.3017
5/6 bore	0.3041
11/12 bore	0.2963
bore full	0.2500

To calculate the depth of water in a known pipe diameter from the equivalent area using Equation (3) was a very difficult exercise. The simplest method was to employ an iterative technique of calculating areas from depths and compare the result to the area required. Adjustment of the depth value on inspection was a relatively easy task. Recourse was made to a programmable calculator and this reduced the task to a reasonable duration.

From the results, the corresponding Hydraulic Mean Depth Factors (H.M.D.F.) were determined. The source for these values was a Table given in the Sewers and Sewerage text-book (Ref. 10).

The calculation of flow rates and times was performed by putting values into Equation (2), again using a TI59 programmable calculator. These were determined for each conduit section and the results can be seen in Table 2. The times have been converted to minutes and cumulative times are also given.

Table 2

Conduit Section	Minutes		
	Time	Cumulative Time	Observed Time
A	1.27	1.27	-
B	2.03	3.30	-
C	0.87	4.17	-
D	4.00	8.17	10
E	12.63	20.80	-
F	6.52	27.32	240
G	2.33	29.65	-
H	32.56	62.22	-

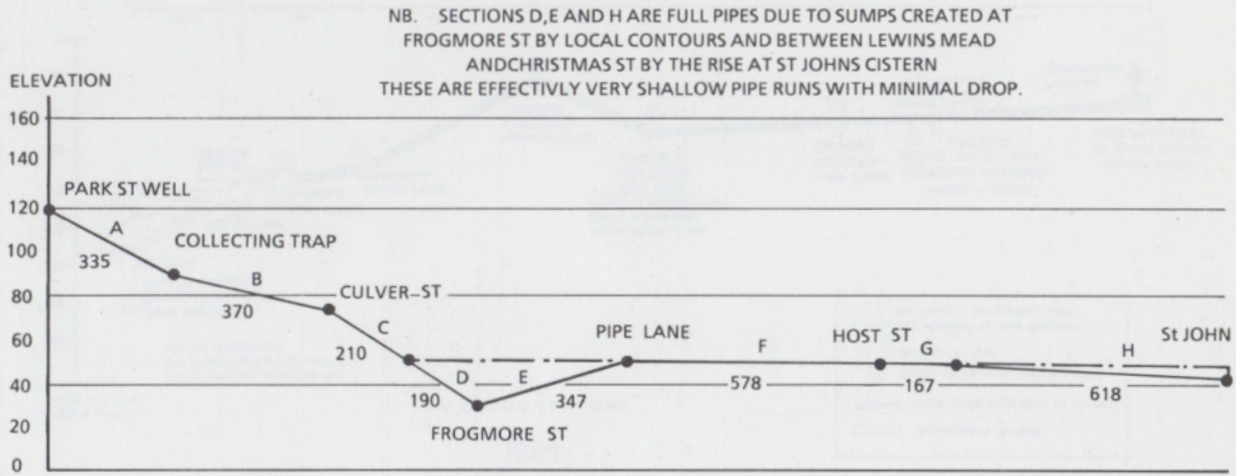


Figure 24. St John's Conduit, Vertical Elevation.

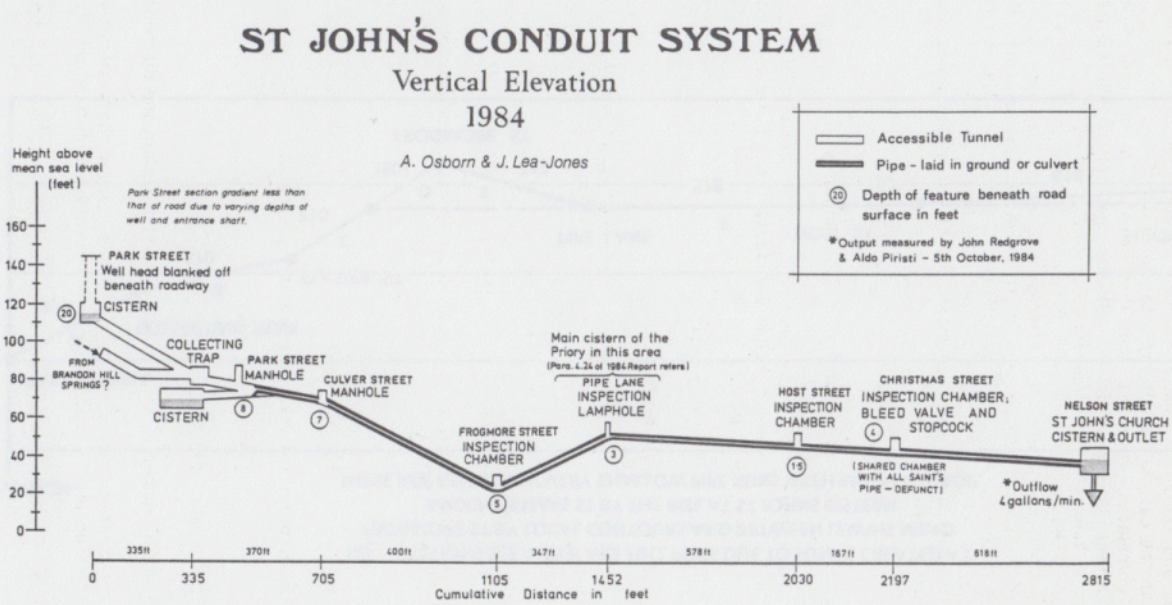


Figure 25. St. John's Conduit, Vertical Elevation (to scale)

At Frogmore Street, there was a discrepancy of 20% between the theoretical and observed times. At Host Street, the observed time was greater than the calculated time by a factor of 13.35.

The correlation between the theoretical and observed times at Frogmore Street is sufficient to validate the calculation method. The discrepancy at Host Street is therefore significant.

The observed transit time from Frogmore Street to Host Street is 230 minutes. When testing at Host Street, the water in the conduit was observed to be running freely and so it could be assumed that the Pipe Lane to Host Street section was running as predicted. The discrepancy, therefore, occurs between Frogmore Street and Pipe Lane.

The transit time from Frogmore Street to Pipe Lane, from the observed results, is, therefore,

$$230 - 6.52 = 223.48 \text{ minutes}$$

$$\text{Calculated Time} - 12.63 \text{ minutes}$$

Assuming a pipe diameter in Section E of the conduit of 2.25 inches and the length of the section being 347 feet, the theoretical volume of water in the section if the pipe is full is:

$$v = 347\pi(1.125/12)^2$$

$$= 9.59 \text{ cu.ft.}$$

Alternatively, with a rate of flow of 4 gallons/minute and a time of 12.63 minutes:

$$v = 4 \times 0.1605 \times 12.63$$

$$= 8.106 \text{ cu.ft.} \qquad (1 \text{ gallon} = 0.1605 \text{ cu.ft.})$$

Given that the actual time is 223.48 minutes, the volume of water in section E of the conduit is:

$$v_1 = 4 \times 0.1605 \times 223.48$$

$$= 143.474 \text{ cu.ft.}$$

Therefore, the extra volume of water ($v_1 - v$), is:

$$143.474 - 8.106$$

$$= 135.37 \text{ cu.ft.}$$

There are a number of theories which could explain the discrepancy.

(a) Section E of the Conduit is much longer than estimated.
(b) The pipe in Section E is of much greater diameter than that estimated.
(c) The pipe in Section E is damaged so that the tunnel or culvert is full of water as well.
(d) The extra volume actually represents the missing cistern.
(e) The calculations are in error.

To deal with the theories in order:

To account for the greater volume through a greater length of pipe, for the same pipe bore (2.25 inches), the pipe would have to be

$$347 \times 143.474/8.106 = 6142 \text{ ft.}$$

Even allowing for changes from the original pipe route this amount of pipe is inconceivable.

For the discrepancy to be due to a larger diameter pipe, the diameter required would be

$$d = 2(143.474/347\pi)^{1/2} \quad \text{(transposition of } v = \pi(d/2)^2 l\text{)}$$

$$= 0.7255 \text{ ft.}$$

$$= 8.706 \text{ inches}$$

This is a large size but, interestingly, is comparable to elm conduit bores which have been observed as approximately 7 inches. A lead pipe would have been made from a sheet 27 to 36 inches wide. This would have been expensive and there would be no reason for having a larger diameter pipe at this end of the System.

With regard to the flooded culvert theory, the culvert cross-sectional area would have to be the same as the 'larger pipe' above. The Culvert section in Park Street is approximately 3 inches x 9 inches in cross-section, an area of 0.1875 sq.ft. The length of a flooded section representing the estimated 'extra' volume in Section E is

$$135.38/0.1875 = 722 \text{ ft.}$$

This value is approximately twice the estimated length (347 ft.) for Section E of the System.

Coming now to the theory that the discrepancy is due to a hidden cistern, the missing volume of water, 135.38 cu.ft., assumes that the conduit is as described for the theoretical calculation. If this assumption is correct, the volume of any hidden cistern has to be at least this. Such a volume could be achieved by a cistern not less than 6 ft. x 5 ft. x 4.5 ft.

This is a relatively small storage volume compared to the Park Street cistern which is approximately 20 ft. x 6 ft, depth unknown. The St Nicholas cistern is reported as holding 20 tons or tuns of water which would imply it was 12 ft. x 12 ft. x 5 ft. or 6 ft.

However, when one considers that this cistern, if it exists, has been hidden for several centuries, it would probably have silted up over the years and thus be considerably reduced in capacity. If it had been partly filled in with rubble or hardcore this would also account for the reduction from a practical capacity.

Inevitably, some inaccuracies will have crept into the calculations and these must be taken into account.

The pipe diameter assumed for each section is derived from the sample of medieval pipe held by T.L.H.G. The actual bore of the pipe may well vary, particularly where its route has been altered. Allowance was made for a modern 3 inch bore pipe from Culvert Street to Frogmore Street. The pipe in Host Street is cast iron, not lead, which would also imply a 3 inch bore. This variation is not significant on shallow-depth runs but is

significant when the section is full.

The pipe lengths were derived from small scale maps and may be inaccurate by 10 ft. The drops in each section were derived from height estimates at street level and observed depths of pipe features. The height estimates were derived from 25 ft. contour maps and spot heights. Height may therefore have a tolerance of 5 ft.

Fortunately, the calculations employing these values tend to reduce the effects of the inaccuracies since square, cube or fifth roots are taken.

The assumption that full sections have an equivalent drop of 0.25 ft. is probably one of the most significant. It can be seen that the full sections account for 75% of the total calculated transit time.

It may be seen that there is a two minute discrepancy between the calculated and observed times at Frogmore Street. If it is assumed that this inaccuracy occurs solely in the full Section, Section D, then the transit time in Section D is six minutes instead of four minutes. This implies a correction factor of x 1.5 for full pipes. Therefore, the transit time for Section E should be corrected to 12.63 x 1.5 = 18.945 minutes.

With a rate of flow of 4 galls/min, this would mean a total Section E volume of 18.945 x 4 x 0.1605 = 12.163 cu.ft. This obviously does not account for the Section E discrepancy.

The assumption concerning the Pipe Lane peak point in the conduit is open to question. If this point was displaced towards Host Street, the transit time for Section E would be increased and a greater volume of water would be assumed. For instance, assuming that the peak point occurs at the Colston Hall would mean that Section E was increased to 611 ft. Re-calculating the transit time, we get a new value of 32 minutes. At our standard rate of flow, this would give a Section E volume of

$$32 \times 4 \times 0.1605 = 20.5 \text{ cu.ft.}$$

The time is insufficient to account for the discrepancy. With the increase in Section E pipe volume, the extra volume becomes 123 cu.ft. This volume is still significant.

Re-working the calculations for the theories (b) and (c) on Page 35:

A larger diameter pipe would be

$$143.474/611 = 0.235 \text{ sq.ft.}$$

$$= 6.56 \text{ inches diameter.}$$

This would probably be excessive for a medieval lead pipe but not for an elm conduit.

The volume of 143.474 cu.ft. would require a flooded 3 inch x 9 inch culvert, 765 ft. long. This is too long but if a larger cross-section culvert is assumed, say 6 inches x 9 inches (twice the area), then as one would expect, the length is halved to 382.5 ft.

If the culvert is large as in Park Street, or the tunnel beneath Host Street, then a relatively short section could account for the discrepancy. Taking the Host Street tunnel as an example, the smallest section is 24 ft. x 4 ft. x 1.75 ft. This is a volume of 168 cu.ft. For the missing volume of water (123 cu.ft.), the section would be approximately 17.6 ft. long. If this were, more practically, an inclined tunnel of this cross-section (4 ft x 1.75 ft.) full to the roof at the Host Street end (see Figure 26), the length of the tunnel would be approximately 35 ft.

It is considered that the existence of a relatively large body of water

below Pipe Lane and/or Colston Street is very probable. This water is probably lying in a partially flooded culvert due to a break in the pipe in the culvert. The break probably occurs after the highest point in the conduit in Pipe Lane.

The existence of a cistern is regarded as unlikely because of the low volume and the probability that such a cistern would have been filled in during the construction of the relatively new buildings in the area.

The following actions are recommended for future action:

* Try to establish a detailed, accurate definition of the conduit run between Frogmore Street and Host Street e.g. length, pipe diameter etc, and depth below street level.

* Establish the 'head' of water above the Frogmore Street inspection cover. A simple pressure measurement should be adequate. This will confirm the height of the Pipe Lane peak point.

* Check the Pipe Lane lampholes to see if the water is filling the pipe or not.

* Repeat the dye test from Frogmore Street and Pipe Lane and measure the transit times to Host Street accurately. This will narrow down the search area.

* Check the constancy of the flow rate as often as possible up to the end of 1984. This should give a reasonable estimate of variation between dry and wet seasons, if any.

* Conduct listening tests to ascertain the track of the conduit. Any variations of sound, if detected, might indicate the presence of large cavities beneath the surface.

* Investigate echo location techniques or metal detection to trace the conduit route.

* Given a minimum rate of flow of 4 galls/min, estimate the demand for the Carmelite establishment and thus determine the capacity of their cistern.

* Contact the 'way-leave' offices of the public utilities (telephone, gas, electricity). There may be some notes on underground features in the area. The utility routes must have been reorganised when the original buildings were demolished and the New Entertainment Centre was built.

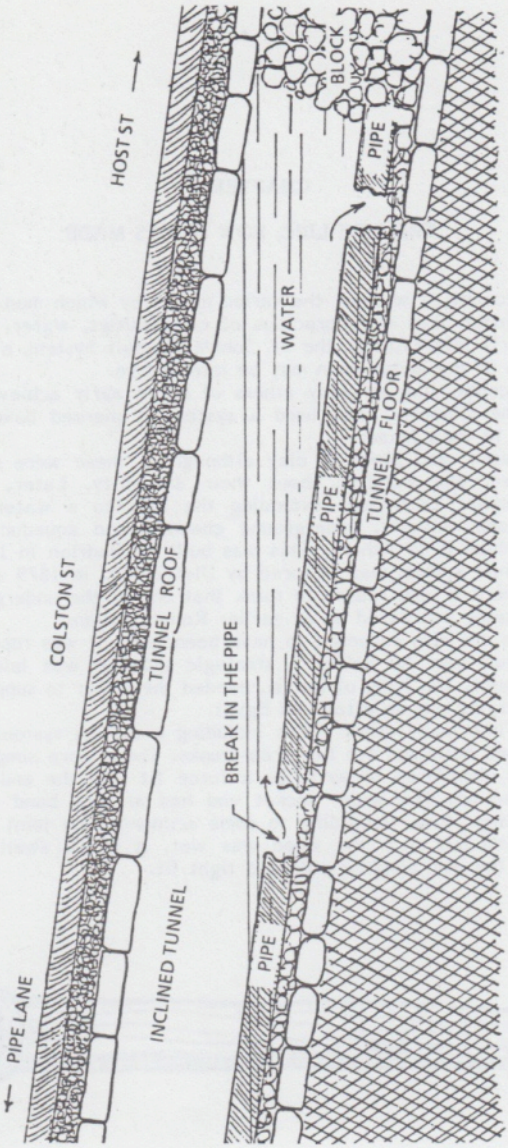


Figure 26. Partially Flooded Culvert (Effective Cistern).

CHAPTER 9

THE PIPE LINE, HOW IT WAS MADE

This is an account of some of the varied means by which man has produced pipes to transfer that most precious of commodities, water. Although we are particularly interested in the St. John's Conduit System, a brief look at the evolution of the water main may be informative.

This account, like so many others of man's early achievements, must start with the Chinese. They used a system of pierced bamboo pipes to supply water to their homes.

The Greeks used pipes of clay although as these were sun-hardened, not kiln fired, one wonders about their durability. Later, the Romans adopted a similar technique, extending the idea to a water distribution system of stone culverts, underground channels and aqueducts, a famous example of which is in Athens. This was built by Hadrian in 134 (Ref. 25). The fifteen mile system was restored by Ulen & Co. in 1879 and is still in use today. There is also reason to think that one of the underground tunnel systems in Exeter was based on an earlier Roman system.

Ox-hides are also supposed to have been used. It was reported that in 525 B.C., what may be called a strategic pipeline was laid across the desert. Cambyses, the King of Persia, needed the water to supply his troops who were carrying out an attack on Egypt.

Bristol, like many other towns including a famous system at Islington in London, used hollowed out Elm tree-trunks. These were simply bored out with one end chamfered so as to be a force fit into the end of the next section and so on. The wider socket end had an iron band around it to prevent splitting. Also, according to some accounts, the joint was puddled with clay, although once the wood was wet, it would swell against the constraint of the iron band so making a tight fit.

Figure 27. Example of Elm Pipe Preserved in the Fire Station Museum at Temple Back.

These would have been much cheaper than lead pipes but they must have had many disadvantages. The joints would have been fragile and subject to ground movement, while the pipes themselves would have been heavy and cumbersome, with only gradual changes in direction being possible. The making of junctions must have been difficult, perhaps this accounts for the expression 'a branch pipe'?

Latimer, in his 'Annals of Bristol in the 17th Century', reports on the problems that beset the Quay (key) pipe. It used elm trunks as illustrated in Figure 27 and was supposed to bring the water from the 'boiling wells' at Green's Hill, Ashley Down, to the City. The complaints were many, usually because cats fell into the supply cistern and blocked the pipes (in one audit book, there were four such entries within three months). To our knowledge, there are no wooden conduit pipes still in use.

Lead pipes were also used quite extensively in Bristol, with the lead mines on the Mendips not far away and, even closer at hand, the rough 'Gruffy' ground on Durdham Downs is the remains of old lead workings.

The pipes varied in size from a few inches to over six inches in diameter. one of the problems with lead is that it has always had a good scrap value. Indeed, there are numerous reports of the Temple Conduit (Ravenswell at Pylle Hill to Temple Street) being interrupted because people had dug it up and stolen the pipe. The account books refer to payments being made to a plumber to replace the conduit pipe.

Some of the remaining old conduits of Bristol are run in Iron pipe, most likely as the result of 18th and 19th Century re-routeing due to building development. One such example is the Host Street to Christmas Street section of the St. John's Conduit. This pipe is made of cast iron which probably dates it no earlier than the mid or late 18th Century.

Because iron, unlike steel, when heated, does not go through a 'plastic' state prior to liquefaction, the early pipes had to be cast in moulds. This was usually in two halves which were subsequently joined by welding along their length. Nowadays, cast iron pipe is made by a centrifugal process which results in a seamless pipe.

Cast iron pipes were cheap to produce but fragile and very heavy. The cast iron section of St. John's Conduit is a good example. Building work at the bottom of Christmas Steps damaged the pipe although it was buried a few feet under the ground. The damage resulted in a multiplicity of cracks and the further the pipe was cut back to reach sound material, the further the cracks spread. It was decided finally that the sections would have to be replaced and in 1984, the cast iron was replaced by ductile steel pipes.

In 1940, steel pipes were made by producing a continuous length of steel strip or plate which was heated until soft and then passed through sets of rollers to form it into a cylinder. The longitudinal seam was then welded. The pipe so formed was cut into convenient lengths by a circular saw which often travelled along with the formed pipe so enabling the pipe to be produced continuously. This method of construction was used for the fuel 'Pipe Line Under The Ocean (PLUTO)' during World War II.

Nowadays, the larger diameters of steel pipe are made by forming the strip or plate into a spiral (like a toilet paper roll) and again welding the edges. Although this requires a much longer welded seam, it has the advantage that many different sizes of pipe can be produced from the same size of steel strip by re-arranging the rollers.

Steel pipe can also be produced by extrusion. The steel heated to its plastic state, is squeezed from a container like a giant toothpaste tube. Inside the nozzle, however, and concentric with it, is a central rod or mandrel. A ram forces the soft steel out past this obstruction so that it comes out like macaroni and is then cooled before the walls can collapse.

This method produces a seamless, very strong pipe. Modern production methods enable this sort of pipe to be made as long as required. It is this latter style of pipe that has been used to replace the damaged cast iron section between Host Street and the bottom of Christmas Steps.

Pitch fibre is yet another pipe material that is relevant to the St. John's Conduit System. When the New Entertainment Centre was built over Wells Street, the section of tunnel housing the lead pipe between Culvert Street and Frogmore Street was filled in and the conduit was replaced and re-routed.

The new (1984) route, as shown on the plan, is around the new building complex, down Culvert Street and along Frogmore Street. This new section is made of pitch fibre which is a modern, very light and cheap alternative to either lead, cast iron or ductile steel. It consists of layers of vegetable fibres, often jute, wound around a former and then impregnated with bitumen pitch, or more usually these days, synthetic resins. Because of the continuous wound construction, this type of pipe is very strong.

Having considered some of the different pipe materials that have been available to those responsible for the upkeep of the Conduit System, a closer look can now be taken at the original(?) lead conduit which starts its journey at the Park Street Well-head.

Before examining the constructional details of the 13th Century lead pipe, a brief explanation of how lead sheet for the pipe was made may help.

We have the late Leonard Nott to thank for providing the following information on lead working (plumbing) techniques which resulted both from his many years working for Drake & Scull and his researches into the St. John's Conduit System. In addition to drawings based on his notes and sketches which are reproduced herein, there are notes and extracts from the sources listed in Chapter 10, References 20, 21, 22 and 23.

The lead ingots, commonly called 'pigs', take their name from the manner in which they are produced from a large mass.

"When the metal is drawn off, the slag is replaced in the bed again, the fire raised to a glowing red heat, which again melts it, and a new portion of lead is drawn off, as before. The refuse, though still containing about 8 per cent of lead, is now rejected, as not worth further trouble."

The lead pigs were broken off from the 'Souwe' and despatched to the customer.

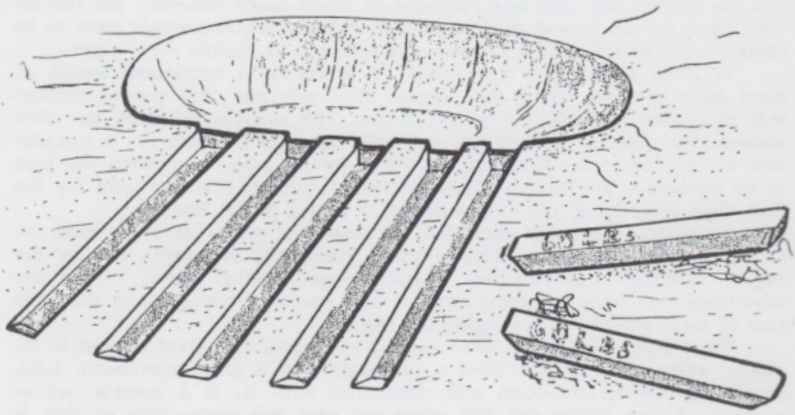


Figure 28. Pouring Lead Ingots.

"In the early Roman period ingots were moulded with the name of the Emperor (Figures 29 & 30). Imperial names ceased to be used on lead ingots after 164-9 and it appears that control of the mine-workings at Charterhouse-on-Mendip then passed to other hands. The tribal council may have exploited the deposits, supplying lead for the pewter industry and for innumerable building operations. This may account for the abundance of late Roman silver coinage in the area since the tribe would be granted a proportion of the output paid in silver. The inscribed ingots also give the names of some of the companies and individuals who worked the lead in the first two centuries under Imperial control. An ingot from Green Ore near Wells produced in the reign of Vespasian (69-79) is marked 'Tiberius Claudius Trit(erna)' (in Wells Museum); this person later worked in the Derbyshire lead mines. An ingot found at the Roman port of Bitterne, CLAVSENTVM, near Southampton, indicates the existence of a company called 'Societas Novaec' working at Charterhouse-on-Mendip in the same reign. Both these ingots bear the inscription BRIT EX ARG VEB which means 'from the British silver mines at Veb.....' which was presumably part of the name for Charterhouse-on-Mendip.

Mendip lead was exported by way of Bitterne (CLAVSENTVM) near Southampton. Isotope studies have suggested its use for a lead cistern in Pompeii before its destruction by Vesuvius in 79.

Figure 29. Lead Ingot From Charterhouse-on-Mendip.
Inscribed Imp (eratoris) Vespasiani Avg (vsti);
"of the Emperor Vespasian Augustus" (AD 69-79)
Cat. No.G1. Length 60.9 cms. (BRSMG: F2807).

Figure 30. Lead Ingot From River Frome at Wade Street, Bristol.
Inscribed Imp (eratoris) Caes (aris) Antonini Avg (vsti) Pii
P (atris) p (atriae); "of the Emperor Caesar Antonius Augustus Pius,
father of the fatherland" (AD 138-161)
Cat. No. G2. Length 54.6 cms. (BRSMG: F4316).

The material from a lead working site at Green Ore (G16) near Wells provides evidence of both the extraction of lead and the process of extracting silver from lead by cupellation. The availability of silver probably encouraged the early exploitation of the Mendip deposits by the Emperor, but it is not certain how much made its way into the coinage as the amount of silver varies from one lode to another."

The booklet (Ref. 23) containing the foregoing information is available from the City Museum Bookshop in Queen's Road, Bristol.

Lead in sheets is used for covering the roofs of buildings, for making cisterns for water, vats for dyeing and for many other purposes, and was produced in the following manner (Ref. 24) and Figure 31.

"Sheet lead formed by casting uses a strong table, from fifteen to twenty feet long and five to six feet broad, made with a ledge around it of an equal height at every part. The top of this table is covered with fine, sifted Red Worcester sand which is spread smoothly over it by being worked with a kind of trowel until brought to a uniform density.

The melted metal is drawn from the furnace pot with a large iron vessel or trough which is raised by a crane and tilted over to cause the lead to run on the sand as quickly as possible. A strike is then drawn over the surface which, by resting on the ledges, pushes forward the superfluous metal and leaves a sheet of it of a uniform thickness equal to the space between the edge of the strike and the surface of the sand. The superfluous metal removed by the strike is forced off the end of the table into a vessel placed to receive it.

The temperature of the lead was determined by dipping a small stick into the lead pot. If the lead burns the stick it is too hot, if the lead hangs on the stick, it is ready for pouring (to throw).

The Bristol City Council House at College Green which has a cast lead roof, was the last public building in which the lead roofing sheets were cast in-situ by the traditional method. The equipment as depicted in Figure 31 was destroyed by enemy bombing of 135 Redcliffe Street on the 24th November 1940.

Smaller sheets as would be used in lead pipe making for instance, were made in a similar way. First, a wooden template of the proposed thickness and circumference was made.

The sand on the table bed (Figure 32) was rammed well down, smoothed with the strike and then sprinkled with French Chalk (talc). The wooden template was then pressed into the sand and removed to form a depression of the required size. The lead, when ready, was then poured onto the bed and the surplus removed with the strike. This resulted in a piece of cast lead of the same dimensions as the wooden template, which could then be rolled and soldered to form a pipe.

Lead pipes are made either by this method or, when of a smaller diameter of one to two inches, by drawing. In the latter method, a cylinder of lead, five or six inches in diameter, is cast with a small hole through its axis. A smooth iron rod, about fifteen feet in length and of the requisite internal diameter, called a triblet, is forced through the hollow lead tube which is then forcibly drawn through a series of holes in iron plates until the lead cylinder is extended over the whole of the triblet. When the triblet is then withdrawn, it leaves the lead pipe of an equal bore.

The fabricated method of lead pipe making can be seen in Figure 33. The sheet of cast lead, made to the dimensions of the wooden template as previously described, is formed around the core or mandrel, once wood but latterly made of iron, using a mallet or 'bossing stick' and a shaped stick called a 'dresser'. The lead is gradually shaped as shown and the seam soldered. The joint was then strengthened by inserting an iron or lead strip

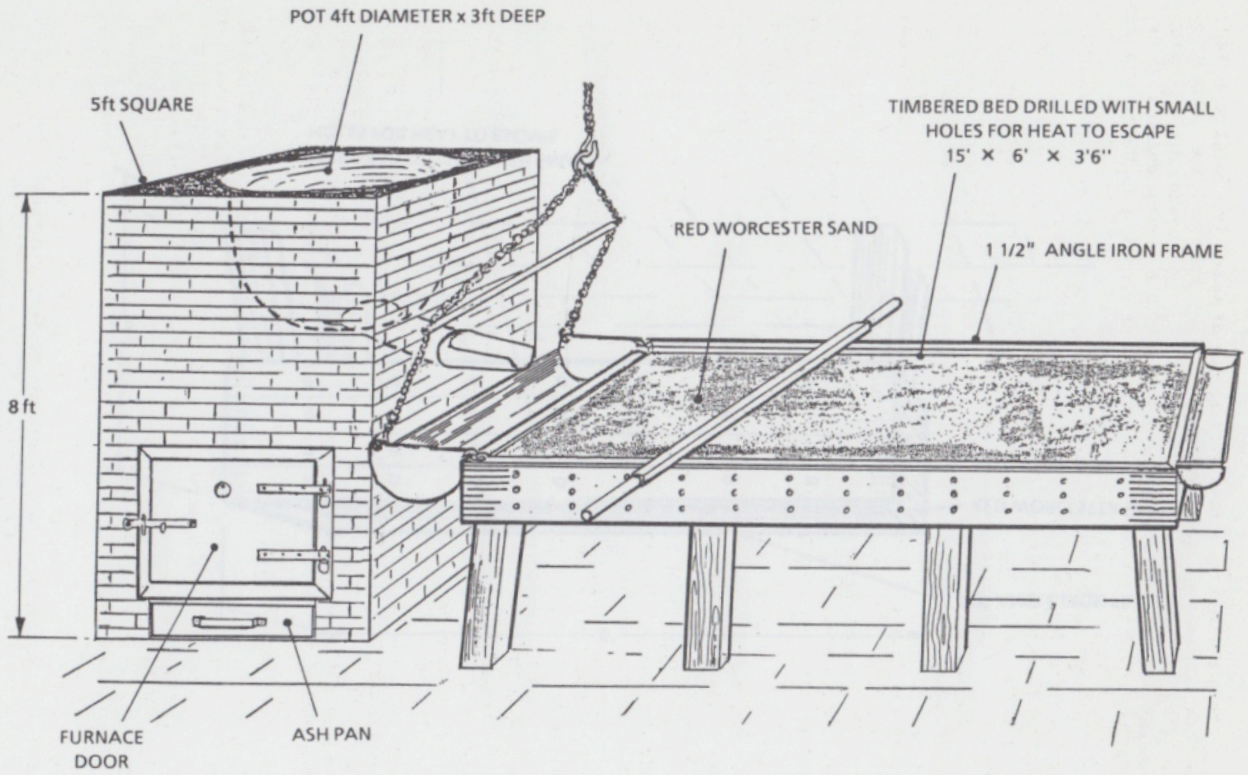

POT 4ft DIAMETER x 3ft DEEP
5ft SQUARE
TIMBERED BED DRILLED WITH SMALL HOLES FOR HEAT TO ESCAPE
15' × 6' × 3'6"
RED WORCESTER SAND
1 1/2" ANGLE IRON FRAME
8 ft
FURNACE DOOR
ASH PAN

Figure 31. Making Lead Sheet.

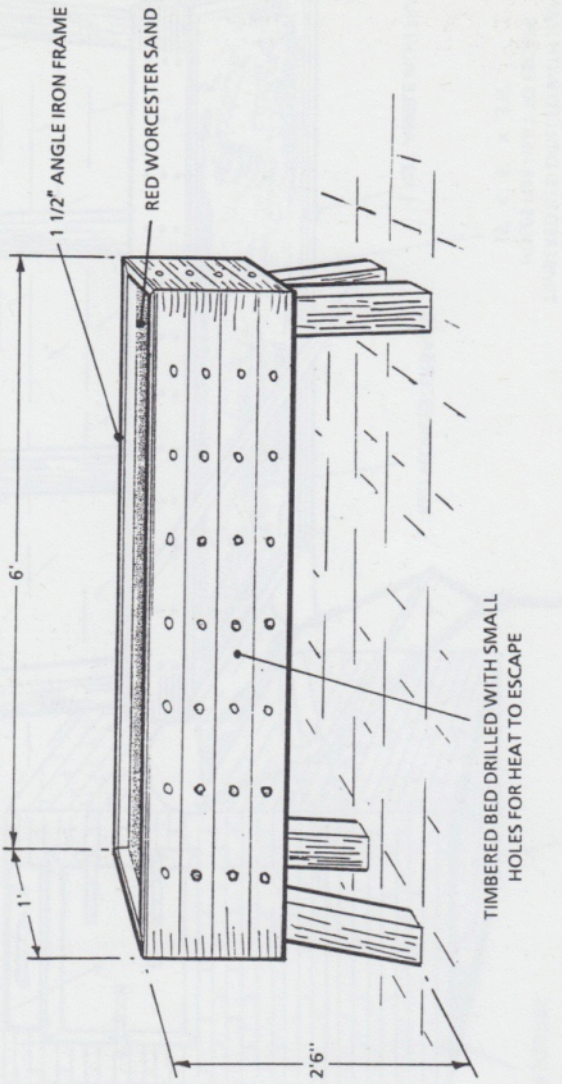


Figure 32. Making Smaller Lead Sheets for Pipes.

in the open 'V' and the joint was finished off by beating on a cover strip over the top of the seam and soldering it in place.

A sample of conduit pipe of this construction was recovered from Frogmore Street (Figure 8) and a section examined. There was no sign of an iron strip and, in fact, the joint appeared entirely homogenous with no discernable join.

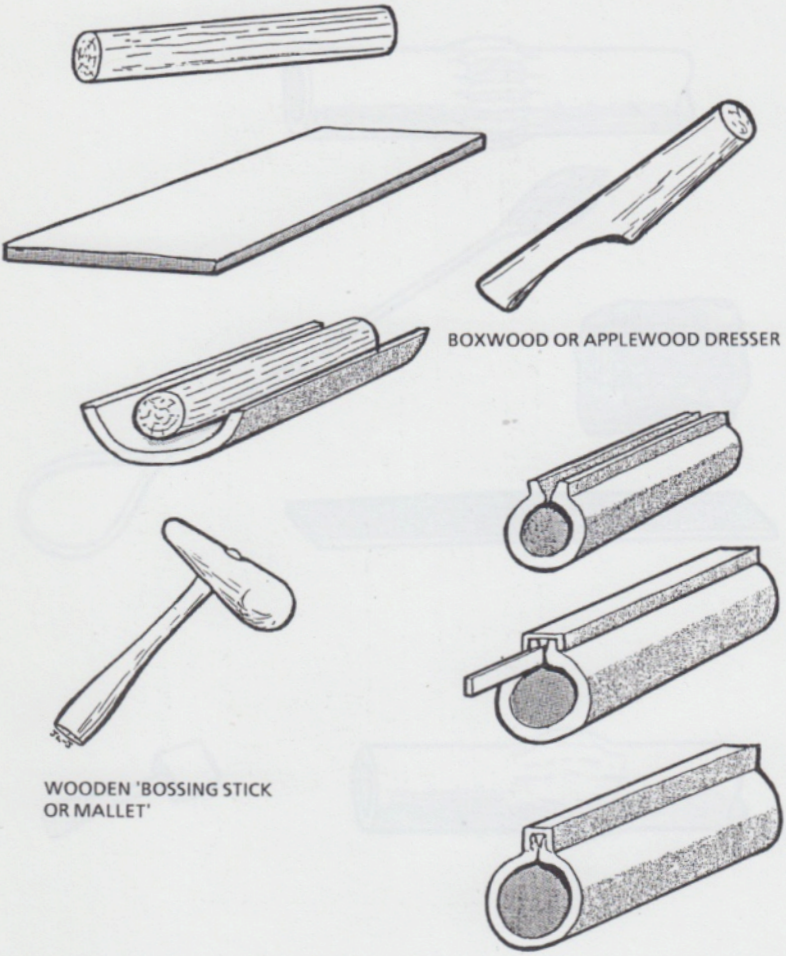


Figure 33. Making Lead Pipe.

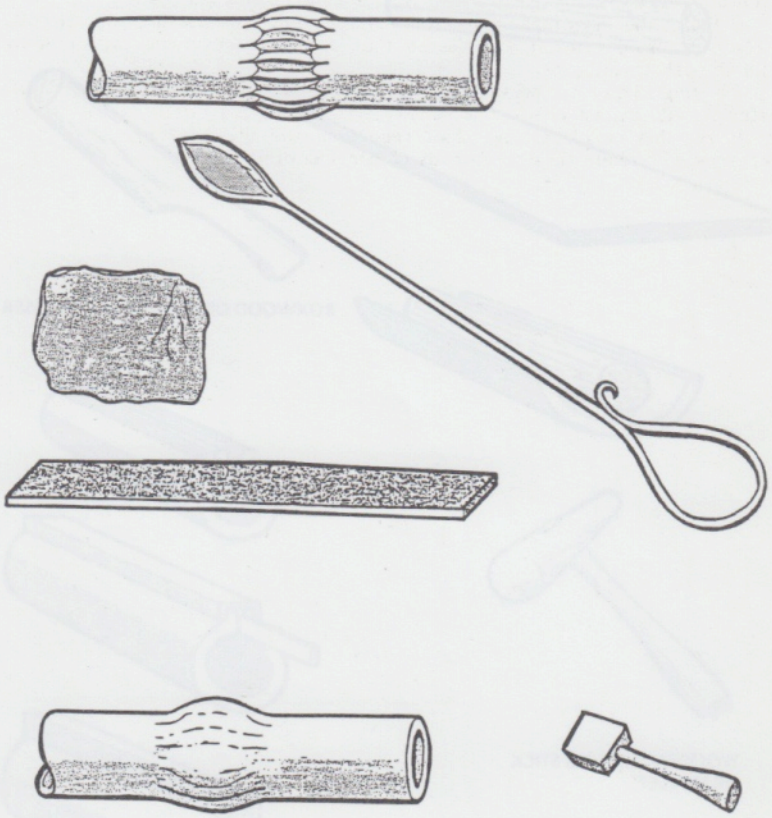


Figure 34. Joining Lead Pipes.

When pipes had to be joined together, the following method was used (see Figure 34). The ends of the two pipes were butted together. A plumbing iron, heated until it was white hot in a brazier was then used to produce a series of longitudinal grooves running across the joint. This served to transfer metal from one pipe to the other and to provide a 'key' for the subsequent soldering.

Solder, consisting of two parts tin and one part lead, was melted in a pot over the brazier. The melted solder was then splashed onto the joint using a splashing stick. The joint was 'wiped' using tallow and a piece of moleskin or a moleskin glove. This left a smooth rounded joint. Resin was used as a flux to assist in the flow of the solder (see Figure 5).

While the drawings show the method used for joining the smooth walled extruded pipe, it is believed that a similar technique was used to join the fabricated pipe.

During the 1985 programme of work referred to in Chapter 5, an attempt will be made to examine some of the pipe joints in more detail. However, this concludes the brief report on the different styles of pipe, together with their various methods of construction.

CHAPTER 10

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Page 157 incorrectly refers to 'White' Book of the Guildhall of Bristol, folio 9'. Also, plumber incorrectly named as Hugh Durenge.
NOTE: This error has been transferred into many contemporary books of Bristol's history.

3. 1850's. The pipes, pumps and conduits of Bristol. Author J. Leech. Editor, Proprietor of the Bristol Times & Felix Farley's Journal. Central Library Reference, B8756.

4. 1911-1913. B.O.H. reports (Urban & Port). B.R.O. reference 33416(12).

5a. 'Terriers' property and records (5117) Park Street B.C. Valuer's Dept.

5b. Reece Winstone (Bristol in the 1880's). Page 95. Advertisement for the Nell Gwynne Cafe formerly at No. 56 Park Street.
NOTE: Ref.5b contradicts Ref.5a. However, Ref.5b is considered to be correct.

6. 1931. Mr. H.C.M. Hirst's report appended to map of route. (Single foolscap sheet). This appears to be based upon his 1903 survey. The 1935 update of this includes an extra paragraph (author unknown) with details of 'another' cistern.

7. 1959. Mr. L. Nott's account of visit to Park Street section together with description, extract from Drake & Scull House Magazine. Central Library reference, B21835.

8. 1909. Notebook of Mr. J. Groom containing notes on conduit route and details of pipe, manholes, etc. B.R.O. Reference, 38360.

9. 1865. Map of conduit route, 58 Park Street to St. John's church. Map held by City Valuer's Department.

10. Sewers and Sewerage, Whyatt, 1921, Pitmans Technical primers - Lampholes, Chapter VI, page 47.

11. Reminiscences of Misses E.M. Bragg and D. Woolway.

12. 'Glory that was Bristol'. F.C. Jones, 1946. Central Library Classn. 942.412 (Reserve).

13. Details of niche stored by the Bristol City Museum & Art Gallery are contained in Museum Store under Reference B.R.S.M.G. Q2238.

14. 'Bristol Past & Present'. Nicholls & Taylor. Library Ref. AA9.
Ibid. Pages 181,182 also refer to 'Note 1 Evans p.55' a stone carving of a winged lion which marked the boundary of the lands of St. Mark's.

15. Map 8. Historic Towns, Bristol. Prof. Carus-Wilson. ISBN 085967-183-6.

16a. Map entitled 'Bristol in 1480' by A.S. Ellis, dated 1880, chiefly from the notes made by Wm. Wyrecestre. (Contained in 'Bristol Past & Present' Nicholls & Taylor, Library Reference AA9).

16b. Antiquities of Bristol in the Middle Centuries, including Topography by Wm. Wyrecestre and the Life of Canynge by the Rev. James Dallaway. Published by the Bristol Mirror Office, 1834.

17a. 1828 Ms. book of notes and papers. List of conduits extant in 1828. B.R.O. Reference 01193(16)a.

17b. Poor Rate Book and Consolidated Rate Book for St. Augustine's Parish, 1760. B.R.O.

18a. St. John's Conduit. Western Daily Press, 20.9.1955.

18b. St. John's Conduit. Western Daily Press, 19.8.1954.

19. "Singular Accident in Park Row". Newspaper accounts for 7th March 1883, The Bristol Observer, dated Saturday the 10th March 1883. (No other accounts found). Central Library.
"Much water in the quarry in Park Row accidently released in the making of a tunnel(?) - houses in Wells Street, Culver Street and Frogmore Street were flooded". See also in R. Winstone, Bristol in the 1880's chronicle of events page 103. Our thanks to him for bringing this to our attention.

20. The Manufacture of Sheet Lead and Pipe in the 11th to 13th Centuries - Pompeii.

21. Minerals and Metals - Chapter on lead, S.P.C.K. 1847.

22. 'Penny Cyclopaedia' Vol. V. p.447. And 'The Townley Gallery' in the 'Library of Entertaining Knowledge', 2nd volume.
Reproduced extracts contained in The Penny Magazine Vol. V No.303, Dec. 24th 1836, page 503. The Society for the Diffusion of Useful Knowledge, 59 Lincoln's Inn Fields.

23. Bristol City Museum. 'South Western British Roman Collections'. Max Hebditch, M.A., A.M.A. (B.C.M. - 1970).
Our thanks to the Director David Dawson and Georgina Plowright of Bristol City Museum for providing us with the information on the locally produced lead ingots, as BRSMG.F2807 & BRSMG.F4316.

24. Drawings of conduit pipes together with explanatory notes on construction, complete with drawings of tools (by TLHG). Courtesy of the late Leonard Nott.

25. Blegen Library Athens. Ref. CMX 220/10 Acc. No. 12422.

TEMPLE LOCAL HISTORY GROUP

COMBINES INTEREST IN THE PAST, WITH CONCERN FOR THE FUTURE.

WHO ARE WE?

We are people with a common interest - the history of central Bristol.

WHY 'TEMPLE' LOCAL HISTORY GROUP?

The Group was originally formed in 1979 by employees of a firm situated on the Temple Backs who were interested in their surroundings.

WHAT DO WE DO?

We are concerned with all aspects of local history in the central area of the city, an area not catered for by any other specific group. Our projects have included:-

Old Parish Boundary marks ~ Surveying, Mapping and Restoration.
Industrial Archaeology ~ survey of works prior to redevelopment.
Publications ~ illustrated book, compilation of 16 of our walks and talks.
Street furniture ~ survey and exxhibition of urban features.
Clock Restoration ~ Mr. Langford's historic clock at 30 College Green.
Tunnel ~ discovered in central Bristol, surveyed and mapped.
Cabot Tower ~ re-design and replacement of plaque missing from upper parapet.
E.S.U. Plaque ~ research into plaque removed from Quayhead - aim, restoration or replacement.

In addition to these major projects and a newsletter, individual members are concerned with family history, organizing walks, talks and other aspects of historic research. Note: We try to avoid projects in districts where there is already an active group, although we are always willing to provide help.

WHO CAN JOIN?

Anyone, young or old, as long as they can contribute.

WHEN AND WHERE DOES THE GROUP MEET?

Usually the first Wednesday evening in the month at the Common Room of St. Stephen's Church (near Corn Street).

WHY SHOULD I JOIN?

Our members both broaden their knowledge of Bristol whilst making a valuable contribution to the City's historical heritage. The wide variety of our activities means that we also enjoy ourselves while doing so.

If you feel that you can contribute please apply, you may have the skill or local knowledge that we need!

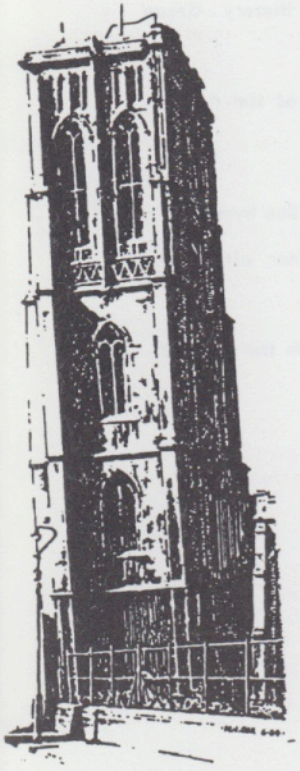
For more details send a s.a.e. to:-

33, Springfield Grove,
Henleaze,
Bristol,
BS6 7XE.

WANTED, MEMORIES

DO YOU REMEMBER ANYTHING OF LIFE IN 'TEMPLE' ?

TEMPLE
LOCAL HISTORY
GROUP



THE HISTORY SOCIETY
FOR CENTRAL BRISTOL

Do you have names of friends or relatives who lived there?

We need your help to reconstruct, life and happening in Temple. People; places; happy or sad we would like to hear from you.

If you can help us we will be willing to make whatever arrangements are most convenient.

In exchange for your help and time you will get:-

- Public acknowledgement (Unless you wish to remain 'anon')
- A personal typed copy of your contribution to pass on to your children or grandchildren.
- Satisfaction in knowing that you have helped put on record a missing bit of Bristol's History.

  (or it may even be an opportunity to put the records straight).

Maybe you have photographs, newspaper cuttings or other memento's of life in Temple that would help us.

All loans safeguarded, and gratefully acknowledged.

Once more if you think that you can help we would be delighted to hear from you at:-

Temple Local History Group.,
33. Springfield Grove.
BRISTOL BS 6 7XE

or

Tel: 421760(evenings)

Contact Julian Lea-Jones. Chairman

FUTURE PUBLICATIONS

Watch out for these other forthcoming Temple Local History Group Publications:

'Survey of Parish Boundary Markers and Stones for Eleven of the Ancient Bristol Parishes'.

'Temple Fee through the Ages'.

'William Langford, Bristol Clockmaker, and the Telegraphic Time System'.

'St. Annes, Bristol. A Historical and Topical Account together with Notes and Anecdotes by the late Eddie Duffet'.

(The production of the above publications will be funded from the sales of this book.)

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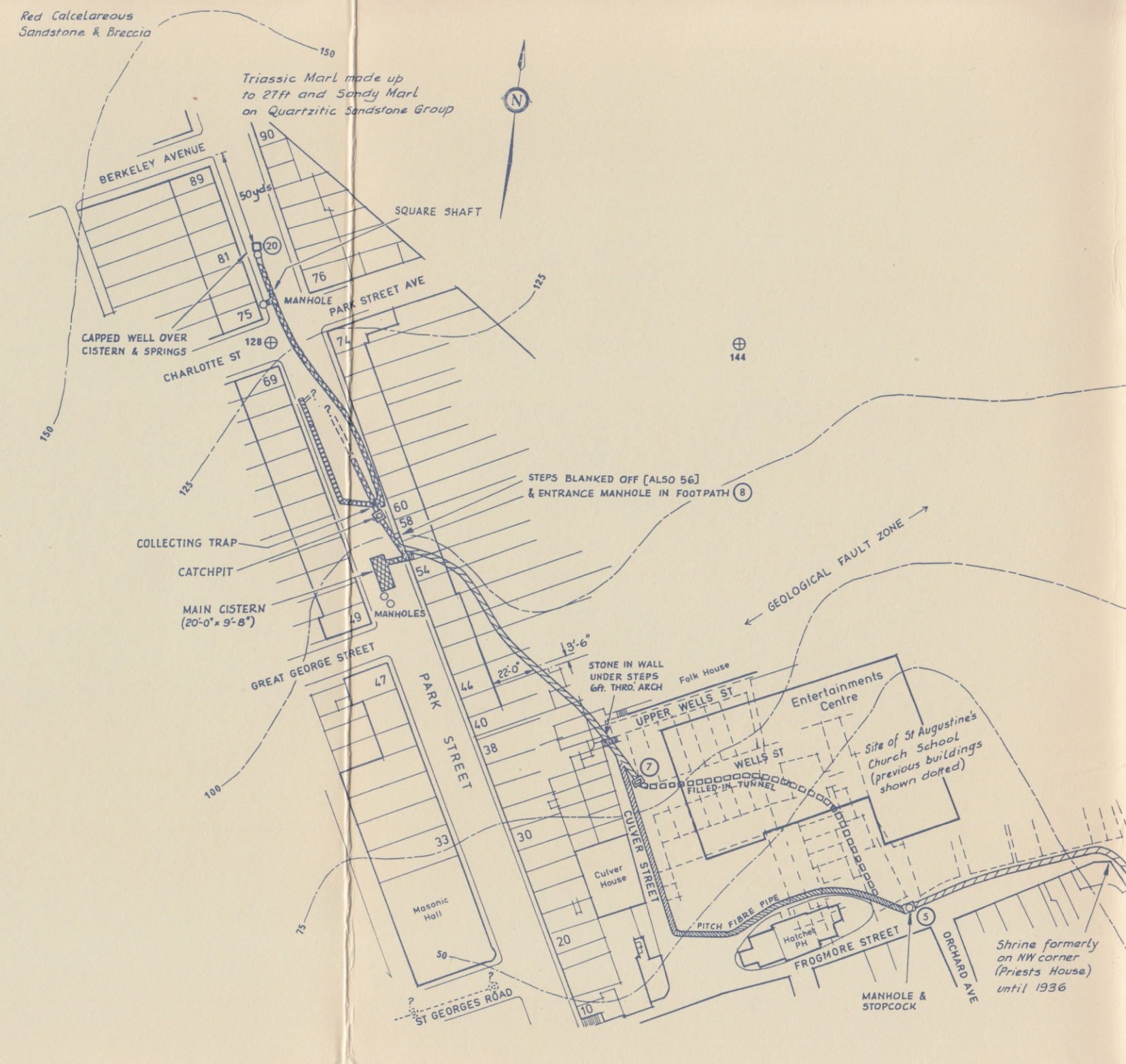
Red Calcelareous Sandstone & Breccia
Triassic Marl made up to 27ft and Sandy Marl on Quartzitic Sandstone Group
BERKELEY AVENUE
50yds
SQUARE SHAFT
MANHOLE
PARK STREET AVE
CAPPED WELL OVER CISTERN & SPRINGS
CHARLOTTE ST
COLLECTING TRAP
CATCHPIT
MAIN CISTERN (20'-0" x 9'-8")
MANHOLES
GREAT GEORGE STREET
PARK STREET
STEPS BLANKED OFF [ALSO 56] & ENTRANCE MANHOLE IN FOOTPATH
GEOLOGICAL FAULT ZONE
STONE IN WALL UNDER STEPS 6ft. THRO' ARCH
3'-6"
22'-0"
Folk House
UPPER WELLS ST
Entertainments Centre
WELLS ST
FILLED-IN TUNNEL
Site of St Augustine's Church School (previous buildings shown dotted)
CULVER STREET
Culver House
Masonic Hall
PITCH FIBRE PIPE
Hatchet PH
FROGMORE STREET
ORCHARD AVE
MANHOLE & STOPCOCK
Shrine formerly on NW corner (Priests House) until 1936
ST GEORGES ROAD
89
81
75
76
74
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128
144
125
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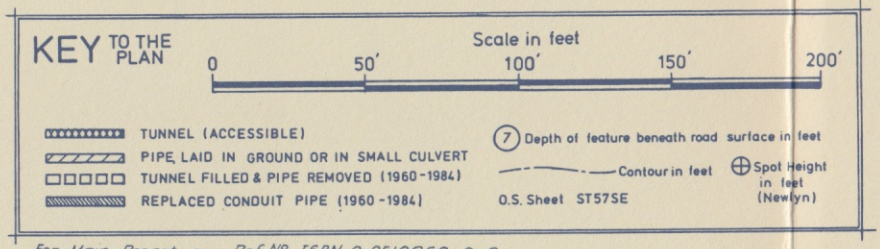
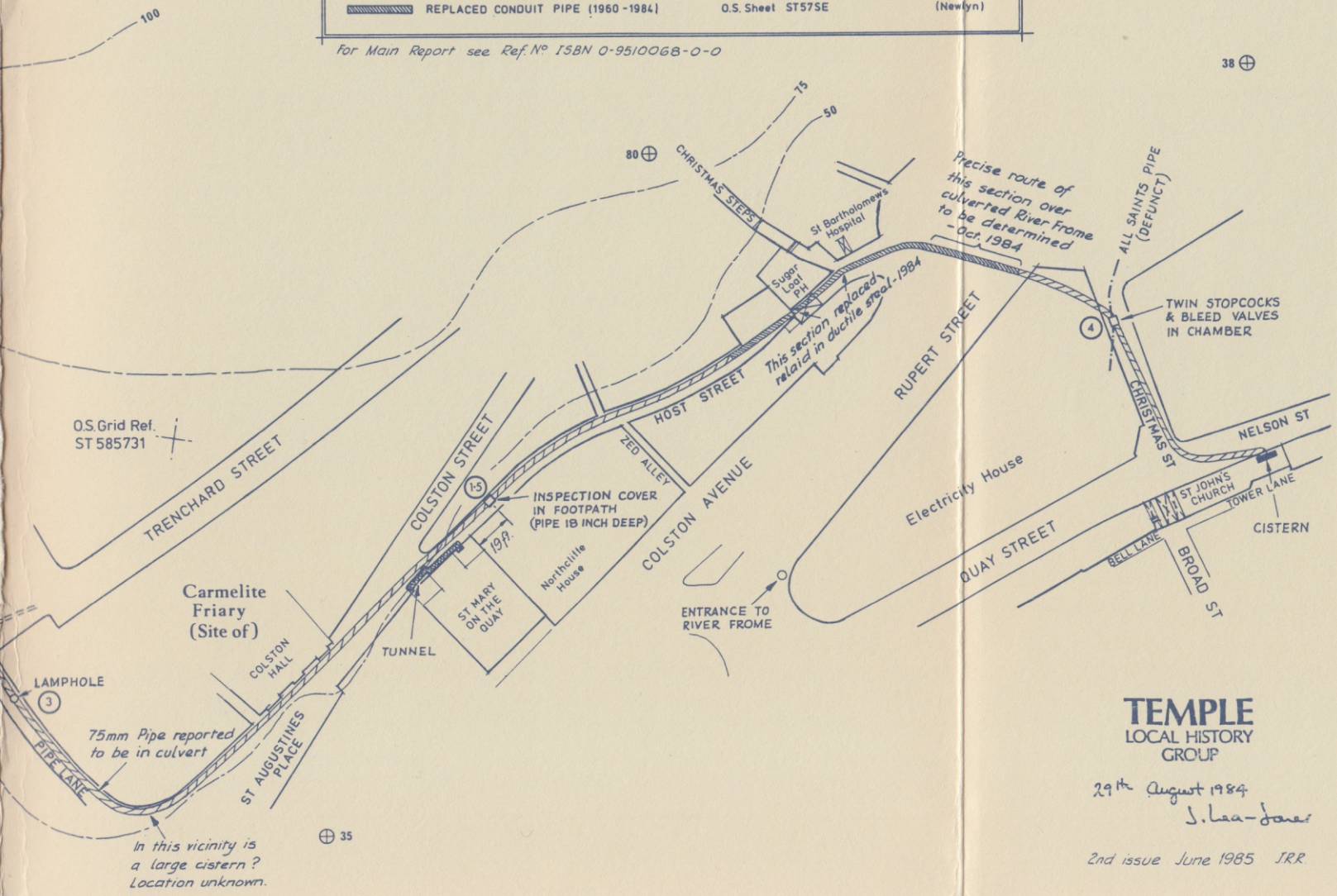
A PLAN OF THE ANCIENT CONDUIT OF St JOHN'S

Together with Features & Details Extant ~ October, 1984

Performed by TEMPLE LOCAL HISTORY GROUP



For Main Report see Ref. No ISBN 0-9510068-0-0



TEMPLE
LOCAL HISTORY
GROUP

29th August 1984
J. Lea-Jones

2nd issue June 1985 JRR

This is one of a series of illustrated articles which it is hoped will be of interest to strangers and Bristolians alike.